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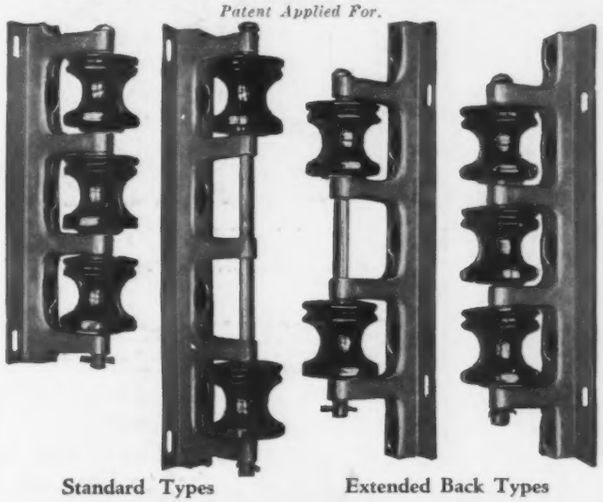

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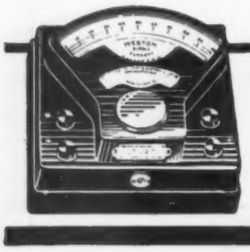

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Electrical World

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W. H. ONKEN, JR.
Editor

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New England's Electrical Council

LAST week's meeting of the New England Council at Burlington, Vt., brought forth the significant announcement that a committee of power interests headed by Charles L. Edgar is ready to co-operate for the general good of the six Northeastern States in clearing up any misunderstanding which may exist as to the policies of the companies or their relations with the state regulatory bodies or with the public in general in the districts in which they do business. The New England governors have appointed representatives for the joint consideration of power problems, and these delegates, usually members of public service commissions, working in conference with the committee of power men, will meet in the near future with the idea of formulating a constructive program and making it clear to the public.

Like many other regions, New England is in a transition state with respect to the co-ordination, development and control of its electrical resources. History has been making very swiftly during the past three or four years in the centralization of management, interconnection and transfer of ownership. A few large financial interests hold positions of outstanding importance in this territory, and there remain many individually owned and operated companies whose relations with each other and with the larger organizations in the coming years present important problems. State lines mean little from the engineering standpoint in energy transfer, and it is both desirable and fortunate that a representative committee of the kind announced is now available to help interpret the economic phases of the changing utility situation to the New England public.

Establish a National Museum for Industry

ELECTRICAL men should encourage all movements to establish industrial and technical museums. These are needed to establish historical facts, to aid educational institutions and to enhance the standing of the industrial arts.

The element of romance associated with museums seems to be measured by the age of the relics. An impression of a baby's hand on a piece of Babylonian mud or the jawbone of the Neanderthal man are treasured as invaluable and give rise to many romantic and artistic essays. An ancient piece of Ming dynasty china or a clumsy Hopi water jar are eagerly sought and held in beautiful buildings donated by rich philanthropists. But the general conception exists that industry and science lack age and lack romance, and no museums are built to house early types. The evolution of industry and of science has not been a matter of years in time, but surely the development has been so rapid that prehistoric relics can be found which are not a hundred years old. The cotton gin, the waterwheel, the telephone, the motor and generator, the steam engine, the locomotive, radio and a host of other devices that have revolutionized industrial and social life are not ancient in actual years, but viewed in perspective the first models are truly prehistoric.

There should be a concerted effort made to house properly examples of industrial equipments and processes from their origin to their modern development. Such a museum should be kept up to date and should be national in character with replicas in all large cities and in the colleges.

Impressions of the Supply Manufacturers' Convention

TWO things were accomplished at the summer convention of the Associated Manufacturers of Electrical Supplies at Hot Springs, Va., last week that should be extremely gratifying to all who are interested in the refinement of the organization of the electrical industry. By unanimous action of a very representative meeting, the supply manufacturers voted to merge with the power apparatus manufacturers to form a national association of electrical manufacturers. The Electric Power Club having already taken similar action, the vote assures the combination of these two important groups of the industry, and it is to be hoped that this may be followed by the affiliation of other groups of manufacturers of electrical equipment, including domestic appliances, so that the entire electrical manufacturing industry may be more effectively co-ordinated in matters of common interest and in a position to speak on occasion with a single voice. For, different as the products of these groups may be, the common denominator of market gives them kinship. Fundamentally they are all vitally concerned in the development of a greater use of electricity by the American people, and they face a coming era of trade expansion that needs intelligent and harmonious support from all quarters.

Action was also taken which should aid materially in clarifying the present confusion in the organization of the radio industry. With annual sales of close to $500,000,000, radio is no longer a mere branch of electrical manufacturing. Revolving around the broad service of broadcasting it has become a great industry of itself, though closely allied with the electrical manufacturing industry in its processes of production and distribution. It was natural in the early days that the radio manufacturers should have come together as a section of the supply association, because so many electrical supply manufacturers were making radio parts. Today there are two organized groups, and the radio industry is facing its problems in two unco-ordinated camps. Now, with radio forming a separate division of the new embracive National Electrical Manufacturers' Association and equal in recognized importance

with the supply and apparatus and executive policy divisions, the way should be open for an eventual union of all the radio manufacturers on a basis acceptable to both the present associations. For both are equally intent upon assisting the orderly evolution of the radio art and industry, and they certainly can achieve more by working together than alone.

Of no less interest was the announcement that the Electrical Manufacturers' Council is at work on a plan that promises the possibility of effecting nationalization of the Underwriters' Laboratories and the tying of that important institution into the organized industry through the American Engineering Standards Committee so that specifications for tests may be no less American standards than our codes themselves. It was a serious-minded convention. Several of the sections were in session for days. Men came away feeling that distinct progress had been made toward establishing the electrical manufacturing industry on a plane of organization befitting its size, responsibility and power.

Psycho-physiological Effects of Acceleration

MOVING sidewalks in congested areas have been proposed more than once and will probably be installed in the course of time. To make them as efficient as possible, they would have to consist of two or three parallel ribbons moving at different velocities to enable a person standing still to acquire the necessary acceleration. In the final stage the structures could move at considerable speed. An interesting preliminary study of human data on such a sidewalk has been recently made in France by Henri Pieron (*Recherches et Inventions*, May 1, 1926). He determined quantitatively certain physiological effects, such as a transient increase in blood pressure, when a person is subjected to different rates of acceleration. The principal psychological effect studied was that of equilibration of an individual at different rates of acceleration exerted for different intervals of time.

Such psycho-physiological studies and the apparatus used are of interest, not only in the particular engineering project involved, but also in connection with high-speed elevators, escalators, certain machine tools where the operator rides with the machine, and in other situations. From a more general point of view, these studies are another lesson and a warning that mere mechanical and electrical considerations alone should not determine the design of a structure used by human beings, but that the propensities and the response of individuals constitute part of design data, these data being capable of expression by numbers.

Graphic Methods Are Gaining Deserved Popularity

TO CLOSE students of industry graphic methods have been almost a commonplace for two decades, but in the utility field this means of diagnosing operating performance has still many applications to conquer. Within the past year or so it has been highly gratifying to note a striking increase in the use of charts and other pictorial methods of analysis among electric light and power companies, and at present it would be difficult indeed to delimit the possibilities of this kind of work. Publishers of drawing material and loose-leaf supplies have awakened to the potentialities of the central-station market for their wares, and the results of a closer co-operation between operating and construction engineers and specialized makers of stationery are now much in evidence. One of the simplest and yet most effective steps forward has come through the making available in small compass of cross-section paper covering 365 days and even five years per sheet, and there are of course many other examples of enlarging the usefulness of record material.

A good deal of independent designing of such chart material is now going on in connection with the establishment and maintenance of inspection of power plant, substation and line equipment, and this is an index that very high-grade methods of management are taking the place of the older haphazard ways of keeping apparatus in trim. Master and key charts are being made up to cover complete performance and inspection data on relay settings, the operation of remote control and automatic substations, life records of rectifier sets, performance of high-tension insulators and many other parts of the system in which prevention of trouble warrants improved means of keeping track of service. From time to time the ELECTRICAL WORLD expects to present developing material of this type to its readers, not with the idea that standardization is close at hand, but in the belief that these graphic aids to operation are destined to prove of the greatest economic value to the thoughful engineer and executive.

Electrical Organization in Russia

IN THIS issue an interesting chart is presented of the present organization of the electrical industry in Russia. An ingenious draftsman has interlinked labor, finance, engineering, law and safety into a marvelously symmetrical diagram. But one wonders how the bureaucracy and interlocking committees work out in practice.

The graph portrays a typical socialistic ideal of an organization developed at a desk to safeguard the interests of the worker at every point of contact. The metal workers' union sits among the mighty as an adjunct to the supreme council of national economy. The professors and experts on the government planning commission submit their plans to labor, and the Soviet Congress passes its decrees through the labor council before they become operative. Many lucrative committee positions are thus made available for labor leaders.

Down below the main electrical department a wonderful organization exists on paper. Power plants are built by the construction division and operated by the operating division. It may be noted that only rural stations have the benefit of the supervision of the district councils of national economy. Moscow and Leningrad need no supervision to be economical. Then the manufacturing plants sequestrated (a polite word) from private owners are organized into a manufacturing trust (trusts and socialism can be reconciled in Russia). This trust makes everything electrical needed in the country, although it has been thought advisable to separate the division of the trust that makes communication equipment from the division making the other devices.

Just how much of this plan is operative is a question difficult to answer. Power stations are being built, privately owned electrical manufacturing plants have

been taken over even if they are not producing, and positive moves have been made to bring about a greater degree of electrification in Russia. It is an interesting experiment to watch, but its organization elements are unnecessary and unwieldy and establish handicaps to rapid development and efficient operation.

The Rating of High-Tension Cable

QUESTIONS of guaranteeing the life of any electrical equipment are notoriously difficult ones. This is particularly the case with high-voltage equipment, and high-voltage underground cable presents perhaps the most difficult case of all. There is probably no more serious problem in the field of high-voltage transmission than the predetermination of the performance, and especially the life, of impregnated paper-insulated high-voltage cables. A reasonably satisfactory situation a few years ago, in which five-year life guarantees were not uncommon, has been completely upset by the tendency to higher voltages and increased demands upon the power capacity of cables. In the effort to reduce costs by reducing power factor and increasing the dielectric strength of the insulating material, manufacturers have apparently overshot the mark and have run into a series of unforeseen troubles. Speaking generally, the present situation is that the ordinary run of cables will meet satisfactorily the factory tests and the specifications of properly qualified technical committees, but when put into service they often break down after relatively short periods. As a result two-year guarantees are now the order of the day. This situation has resulted in a lively but good-natured and co-operative controversy between manufacturers and users of cable.

The seriousness of the difficulty is admirably indicated in the paper on "The Quality Rating of High-Tension Cable with Impregnated Paper Insulation" presented by D. W. Roper and H. Halperin at a recent meeting of the A.I.E.E. The authors give the results of inspection and tests on thousands of feet of high-voltage cables of all kinds, extending over a number of years of service, on the system of the Commonwealth Edison Company. Confronted with the impossibility of finding single tests to answer the questions of ultimate performance, these engineers have set about the attempt to predetermine the life of the cable by means of studies of every feature and material entering into its construction. They assign various percentage values or weights to the different features of workmanship and material, as based on tests and inspection in the factory, on samples delivered and on performance service. The accuracy of these relative estimates has been checked over the years of experience mentioned. The sum total of the percentages gives an average figure for the total quality of the cable. As is to be expected, the properties having the greatest weights are those bearing on the breakdown strength, increase of power factor and other similar electric properties. It is interesting to note, however, that these properties constitute only about 60 per cent of the total, leaving the inference that workmanship on copper and lead, tearing and bending of paper, general uniformity and similar matters aggregate about 40 per cent of the ultimate reliability of the product. These quality tables have been checked by accelerated life tests on hundreds of samples of cable, and it is the belief of the authors that the results from these tests bear out their accuracy. They reach the conclusion that if test and inspection data are properly correlated with operating experience, then such quality-rating tables could be used to predetermine the relative merits of different types of cable and the service record of any particular lot.

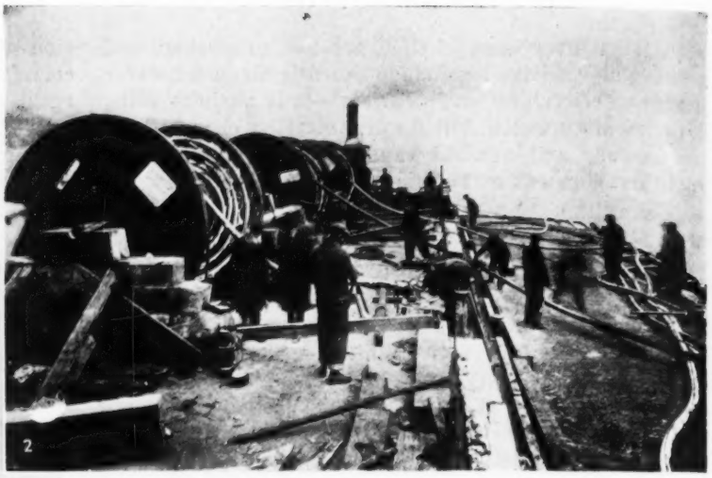
In considering this admirable piece of work, which is not the first of its kind from the same source, it is realized at once that a considerable service has been rendered, first, in clarifying the problem and, second, in presenting data that may be available to others. It is obvious, however, that a work of this magnitude can be carried out only by very large organizations. The value of the results rests largely with those making the study. In quality rating it is obvious that the data must be checked almost daily to follow changes in manufactured product and advances in the art. An independent purchaser of high-voltage cable would find it difficult to make use of the data presented. Moreover, the rating tables do not include a number of vital factors in the ultimate performance of cables. For example, the authors admit that their conclusions are based on the assumption that the impregnating compound is stable. And beyond this the performance of a cable may be affected in serious measure by the methods of handling, of transportation and of installation. Quality pertains to these matters also. The problem has always been recognized as so complex as almost to discourage any attempt at the control of so many diverse and obscure factors. In this paper a notable and important contribution toward the solution has been made.

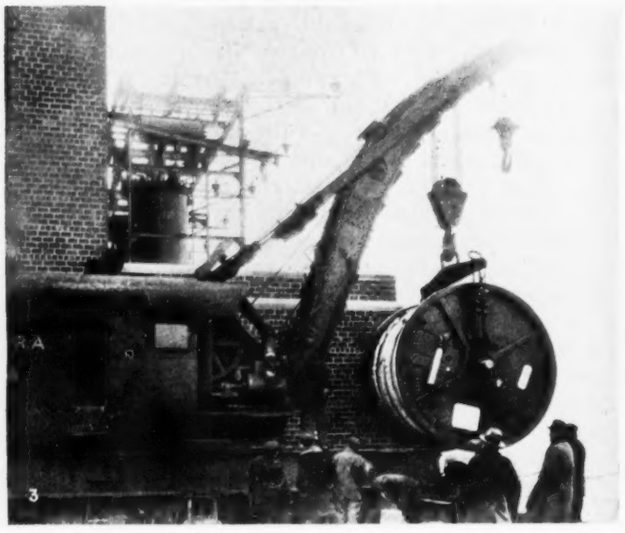
Definite Decision Needed on Union Label Question

MORE than ten weeks have passed since the Council on Industrial Relations for the Electrical Construction Industry of the United States and Canada met in New York to decide on the validity of the attitude of the labor unions in requiring that electrical fixtures bear the union label or else be shipped unassembled and wired by union labor at the point of installation. It is true that little direct evidence was presented to the council at its meeting, nor from the nature of the question can much evidence be presented —but evidence is needed only at a trial and no trial has taken place nor can there be one. A deeper fundamental situation exists, a question of principle is involved.

The council cannot ignore that principle; if it is to continue to determine its effectiveness in the economic structure of the industry, it must reach a definite decision without delay. Is it right or wrong? There can be no evasive answers. The situation must be faced squarely and definitely settled, regardless of how unpleasant it may be. Has the manufacturer a right to organize his methods of production and distribution according to economic principles or must he bow to the dictates of any group? The industry has no quarrel with union labor, and it acknowledges the right of labor to organize and conduct its own affairs and to follow any educational methods it pleases to have electrical products bear the union label. But the industry must reserve the right to itself to determine how its products can be most economically manufactured and distributed. The industry desires a prompt decision, and the council has no alternative but to render it.

Mississippi River Crossing Uses Cable in 2,500-Ft. Lengths





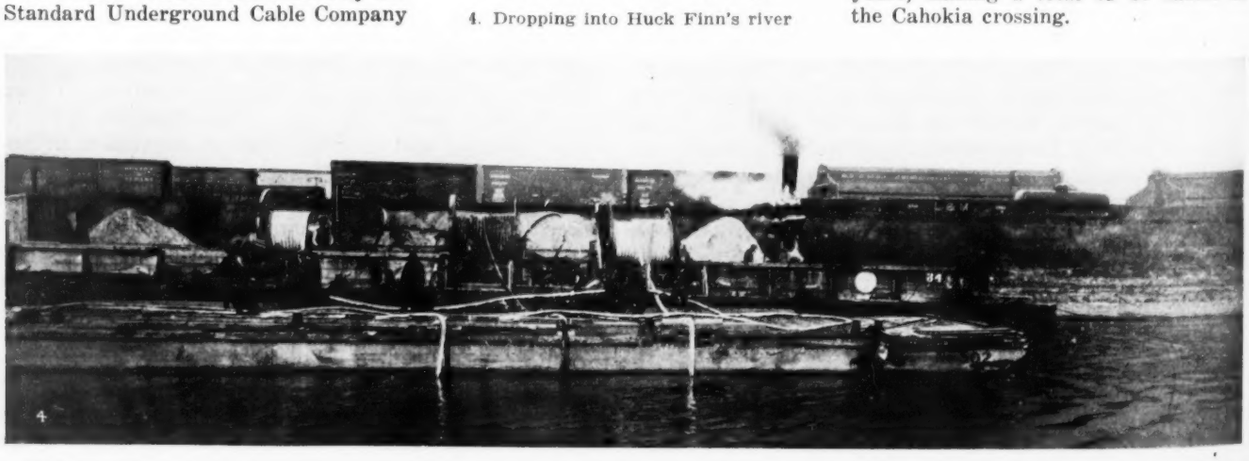
Mounted on Barges and Laid in Single Lengths

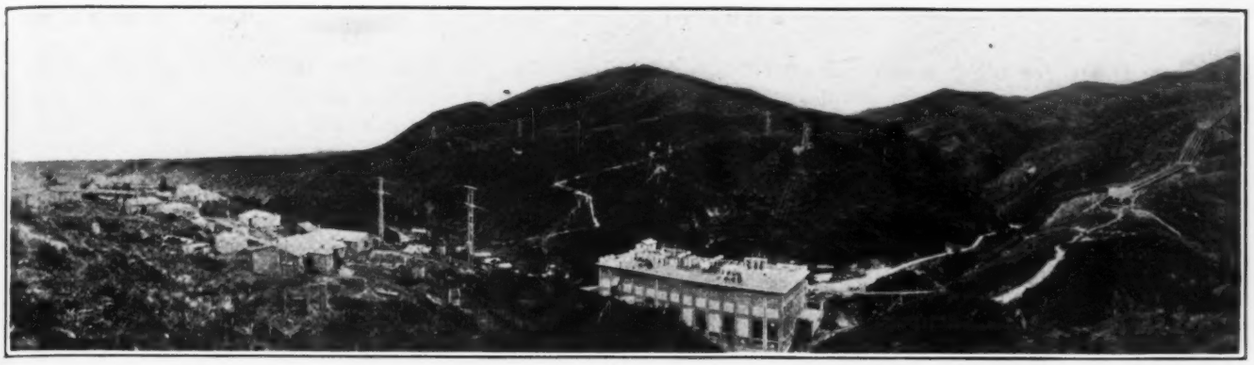
THE Union Electric Light & Power Company of St. Louis recently installed successfully three 33-kv. submarine cables across the Mississippi River between the Cahokia plant in East St. Louis and the west bank. This installation establishes a record for length, size and weight of high-voltage lead-covered and armored submarine cable manufactured and installed in single lengths.

The cables were manufactured by the Standard Underground Cable Company in lengths of 2,500 ft., weighing more than 27 tons, and are approximately 4½ in. in diameter. The cables were shipped on specially constructed iron reels weighing 5 tons each, making the gross shipping weight for each length more than 32 tons.

Prior to production of these cables the maximum length that could be manufactured was about 1,200 ft., which necessitated a splice in mid-stream, and 21 cables of two lengths each had previously been installed at this same location. It is planned to install 24 more of the 2,500-ft. single-length cables during the next three years, making a total of 48 cables at the Cahokia crossing.

1. Lowering to the reel bearings on the barge
2. Paying out from the reels
3. The cable at the dock edge
4. Dropping into Huck Finn's river





MANGAHAO DEVELOPMENT AND SURROUNDING TERRAIN

Electrical Development of New Zealand

By W. A. Waters

Resident Electrical Engineer Manawatu-Oroua Electric Power Board, New Zealand

General Scheme of Administration and Operation—Decentralization of Management and Independent Local Control—Utilities Have Taxing Power to Guarantee Revenue—Statement of Rates—Special Reasons for Governmental Operation

IN NEW ZEALAND the electrical development of the country is, in the general sense, a function of the Dominion Government. However, realizing the difficulties of administering all the details of such a ramified business as electricity supply, the central government limits itself to certain supervisory and authoritative powers and to a fixed part of the operating system. The government's policy is to build the big hydro stations, erect transmission lines at 110,000 volts, and install stepdown transformers to 11,000 volts. All distribution to consumers is on the four-wire, three-phase system, 400/230 volts. No other distribution voltage is permitted, in order to have uniform standards.

The distribution of the power to consumers is in the hands of local bodies known as "power boards." New Zealand has been divided up into 52 power board areas, which vary in size from 137 square miles to 11,000 square miles. The larger towns are included with the rural areas adjacent, and in many cases the boundaries are natural, such as mountains and rivers, or very sparsely settled areas. To date 61 per cent of the area of New Zealand, embracing 59 per cent of the population and 70 per cent of the unimproved land value, is under the jurisdiction of the 40 power boards which, so far, are in operation.

When the residents in any power board area decide to avail themselves of electric power, a petition is forwarded to the Governor and the area is gazetted as a power board. The members of the board are elected from the community by the votes of those owning land in the area. The number of members on a power board varies from five to twelve and depends on the population and number of counties and boroughs, but every county or borough has at least one representative on the board. In practice usually the members of the power board are either mayors of towns or chairmen of counties or else are well-known public men who have given their

New Zealand Conditions Affecting Power Development

TO THE EDITOR:

With regard to the question of government ownership of the power system in New Zealand and the formation of power boards to sell the power, this has been brought about by several reasons of New Zealand's special conditions.

The former municipally owned generating stations were in most cases too small to permit of economical working—that is, the overhead expenses were too high in proportion to revenue. Such schemes in boroughs and cities were too "parochial" in a sense, and they could not attempt any rural distribution among the farming community, which really gave to towns their wealth in trade. Our later methods in New Zealand are suited to our small country because we have not sufficient wealthy people who would invest their money in developing private utilities, unless the utilities had the security which power boards have—that is, taxing powers. The government was really forced by economic conditions to take on itself the job of electrical development.

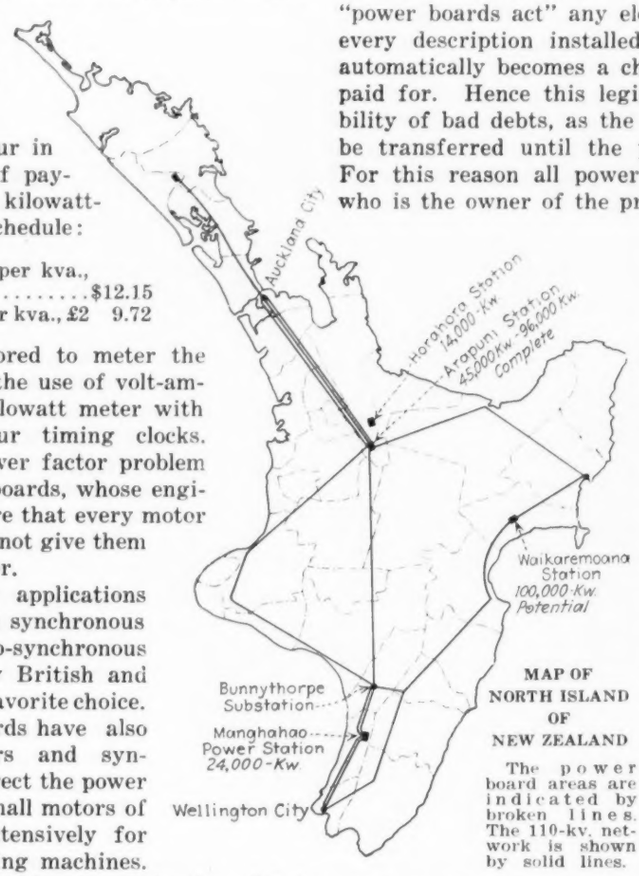
As far as the United States of America is concerned, your electrical systems are developed to a degree that any attempt to place them under government control would, I consider, lead to confusion and muddlement. W. A. WATERS.

services freely for other municipal activities. After a board is elected—and the personnel is usually of a high order as regards ability and integrity—the engineer and staff are appointed and the matter of a bond issue to raise the money to carry out the work of reticulation is put to the vote of the taxpayers in the area. Incidentally the majority of loans authorized by taxpayers to power boards have in the past been carried by overwhelming majorities. The power boards purchase bulk power at the 11,000-volt terminals of the government transformers, which are usually located somewhere near the center of load in each power board area. The method of purchase is on the kilovolt-ampere maximum demand basis only, and the highest kilovolt-ampere load recorded during any half hour in the quarter is the basis of payment (no energy charge for kilowatt-hours) according to the schedule:

First 200 kva. per quarter per kva., £2/10/0 ..... $12.15
Balance kva. per quarter per kva., £2 9.72

The method mostly favored to meter the kilovolt-ampere demand is the use of volt-ampere reactive meter and kilowatt meter with printometers and half-hour timing clocks. Under this method the power factor problem is passed on to the power boards, whose engineers in turn take great care that every motor installed on the system will not give them excessively low power factor.

In most of the motor applications above 40 hp. motors of the synchronous type, or preferably the auto-synchronous type as produced by many British and Continental firms, are the favorite choice. Many of the power boards have also installed static condensers and synchronous condensers to correct the power factor up to unity of the small motors of 2 hp. which are used extensively for driving thousands of milking machines. In the North Island particularly, the production of butter and cheese is the chief business of the farmer and with few exceptions the herds are milked with milking machines driven by 2-hp. motors where electrified or by gasoline engines where power supply is not yet available. There is no irrigation load in the North Island, where the rainfall averages 40 in. per annum without droughts.



MAP OF NORTH ISLAND OF NEW ZEALAND

The power board areas are indicated by broken lines. The 110-kv. network is shown by solid lines.

The power boards are not expected to make profits, but if there is a surplus after paying for power, administration and working costs, interest on loan money and sinking fund of 1 per cent, then the board has to do one of two things:

1. Reduce cost of power to consumers.

2. Extend distribution lines to taxpayers in areas where return normally would not warrant a line being erected owing to small number of consumers.

If a power board fails to earn sufficient revenue to meet expenditures it can, if such action is deemed advisable:

1. Impose a tax to be collected on the unimproved value of all the land in its area.

2. Impose an "availability tax" on all property within ten chains of an electric line, but in collecting this tax a consumer who has power installed must be credited with the amount paid for power during the year. For instance, if the taxes on two properties identical are $100 each and one is a consumer using $90 a year and the other not a consumer, then the non-consumer pays $100, and the consumer who took $90 worth of power would pay only $10 under this taxing system. This tax has been used by only one board, and the non-consumers were thereafter unanimous in joining up at once.

Another feature of our operations is that under the "power boards act" any electrical apparatus of almost every description installed on a consumer's premises automatically becomes a charge on the land until it is paid for. Hence this legislation wipes out the possibility of bad debts, as the title of the property cannot be transferred until the power board's lien is paid. For this reason all power boards give any consumer who is the owner of the property three years credit at current bank rate of interest to pay for the installations of wires, fittings, motors, etc., installed on his premises.

The power boards are expected by the government to administer their affairs in a businesslike way—in fact, like a private company—and of course, being public institutions, they are subject to audit of books by an officer of the audit department, which has a very strict code of rules regarding all expenditures. Any expenditure which the audit office "tags" as illegal under the act must be refunded personally by the members of the board, who in turn are honorary members.* They get one guinea ($5.10) for each regular monthly meeting plus actual out-of-pocket expenses incurred traveling from their homes to the board meetings. The chairman of a board only is allowed an honorarium, which is fixed by the government individually in the case of each board up to a maximum of £200 ($972) per annum.

Each year each power board has to furnish a return to the government giving full particulars of loads for each quarter, kilowatt-hours sold, profit or loss and a host of information classified under 57 headings of

*One of the strict laws of New Zealand is that no member of any power board, borough or city council, county council, etc., can trade with the local body of which he is a member to a greater extent than £10 ($48.60) in any one financial year. The object of this is to prevent any person who is a member of a local body from using his position for private gain. As an instance of how it works, the following is cited: A chairman of a power board received £200 ($972) honorarium maximum as laid down by statute, and at a board meeting it was resolved "that the chairman be given free light and power for his house." When the government auditor spotted this in the minutes, he immediately asked for full particulars of when free service was given and the approximate amount of energy used. The amount of energy used placed the total honorarium above the £200 ($972) allowed by law and the chairman had to immediately resign his position! There are numerous cases where the members of county councils, cities and power boards have traded with the councils or power boards where the trade has amounted to in some cases only a few dollars above the $48.60 allowed by law and they automatically ceased to be members. The law is very severe but it keeps administration clean.

statistics. This is published later and presented to Parliament, and it creates rivalry among boards to produce good returns—that is to say, from a financial point of view, which is especially important in New Zealand.

In 1914 the first government-owned hydro station, Lake Coleridge, was put into operation with a capacity of 6,000 kw., but additions to the station necessitated by the growth of the load have been made until a load of 14,000 kw. is now being supplied, and plans are under way to increase the power of this station to 24,000 kw.

ARAPUNI PROJECT. THE UPPER STREAM BED WILL BE UTILIZED FOR PLANT INTAKE

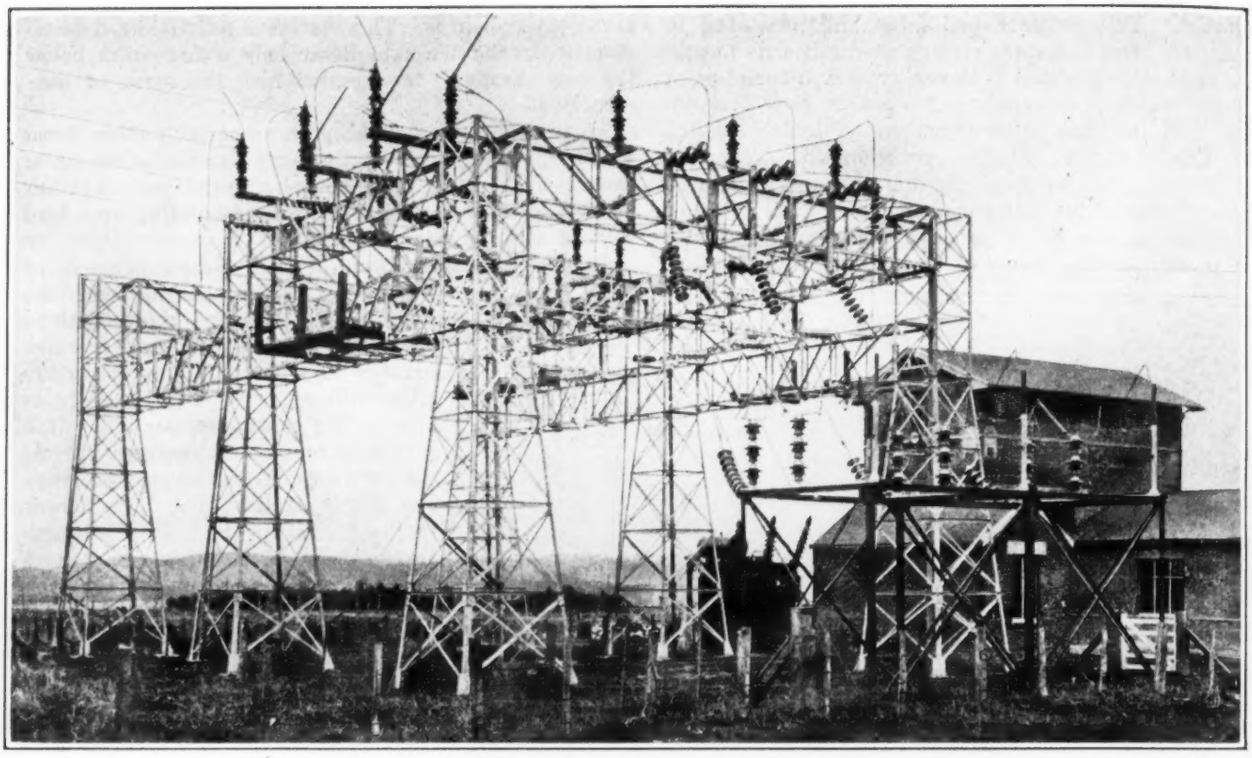
This station is in the South Island and supplies the city of Christchurch and power boards in the vicinity. Owing to the success of this undertaking, the government decided to push the electrification of the North Island (New Zealand has a total area of 102,000 square miles in two main islands—viz., North Island and South Island).

The North Island scheme as proposed will consist of three main hydro stations. Mangahao, of 24,000 hp., was completed last year, and is now being rapidly loaded, and the construction of Arapuni hydro station, 96,000 kw. (45,000 being installed at start), has been under way for the past twelve months. The next station to be developed is Waikaremoana, which has a potential power of at least 100,000 kw. All main transmission is 110,000 volts, 50 cycles, three phase. A few years ago the government purchased the hydro station Horahora (formerly owned by the Waihi Gold Mining Company). Since its purchase it has been enlarged to 14,000 kw. capacity and is now supplying power to seven power boards. This station is a 24-ft. head development on the Waikato River only a few miles below the new Arapuni development now in course of construction.

In the case of several power boards remote from existing government stations or transmission lines, these boards installed their own hydro stations or a steam station in order to push the work of building up a load in readiness for tying in later on.

In the Manawatu-Oroua Power Board district, of which the writer is engineer, the area is 1,301 square miles with a population of 40,000 and embraces five counties and two boroughs and many other villages. The rural density is four to five consumers per mile. One of the boroughs, Palmerston North, has its own distribution and pressure gas power station, but buys power in bulk from the power board. In the cases of Feilding and Rongotea, which had lighting and power plants of their own when the power board was constituted, these plants were taken over by the power board at book value, and a cheaper tariff for power supply went into force immediately. To date we have erected between 500 and 600 miles of transmission and distribution lines supplying every farm with light and power in the more closely settled areas. Before a line is built we insist that the annual revenue must amount to 12½ per cent of the cost of the line. As the taxpayers in the area are the owners of the distribution system, we have met with hearty cooperation from the residents, and the number of consumers connected to the lines is of the order of 95 per cent of the possible connections. There are hundreds of milking sheds electrified, and in the majority of cases where a milking shed has a 2-hp. motor installed a 500-watt or 600-watt hot water heater is installed in the cow shed on a change-over switch with the motor to give 15 to 20 gal. of boiling water for washing and sterilizing the utensils and milking machines. This hot water electrically heated has already improved the quality of butter and cheese manufactured, for it is New Zealand's aim to turn out the highest quality of butter and cheese for competition in the London markets.

In the country homes, electric lighting is used freely, also electric irons and electric hot water heating; and lately our board, like many others, has embarked extensively on an electric range campaign. These are selling freely, as fuel is getting scarce, and it is safe to say that in a few years the number of electric ranges in use in New Zealand will be counted by the tens of thousands. Ranges sell at £20 ($97) each for the model sold by the power board. They are rated at 6½ kw. and have three plates. Incidentally the writer would like personally to thank the ELECTRICAL WORLD for the data which it has published from time to time on the range question. It was the statistics published in the ELECTRICAL WORLD which finally convinced us that



TYPICAL 110-KV./11,000-VOLT, 1,500-KVA. SUBSTATION

the electric range was a profitable load, and a little more than twelve months ago our board began to consider developing a range load, as your statistics proved what we all wanted to know, which was that the range load had a high diversity of demand. We received our first shipment of ranges last October, and the board is now averaging a sale of better than one per day. Many other power boards are doing likewise.

In a few instances power boards have a staff to install wiring, etc., on the consumer's premises and undertake contracting work generally, but in the great majority of boards this work is left entirely to the electrical contractors, with the exception of electric ranges and motors, which, owing to being sold at cut prices, are handled by the power boards themselves in the early stages of development for financial reasons, but the electrical contractors do the work of installation for us. Our experience is that close co-operation between contractors and supply authority will always tend to build up a load on the power system as quickly as any other method. In wiring new areas the work is allotted to contractors by the power board at certain scheduled prices, and each month the electrical contractor is paid in full after our inspectors pass the work. When power supply is given, the power board collects the cost of installation from the consumer or grants three years' terms as required.

The same rates for energy apply for both rural and urban service. The rates are given in the adjoining table.

We have been fortunate in that the Minister in charge of public works, which includes the hydro-electric department, is an energetic New Zealander who has inaugurated the building of the hydro power stations on businesslike lines. Until a paying load is in sight for a power development, the power station will not be built. There are no "political stunts" about it at all, and the Hon. Gordon Coates, who is responsible for carrying out the program as Minister of Public Works, was last June elected Prime Minister of the dominion, but still retains the earlier position. Every year while Parliament is in session there is held a Power Board Conference, at which all the boards are represented by their chairmen and a member with their engineers and secretaries, and matters and problems dealing with the business of electrification are discussed. The Premier always attends these conferences to listen to discussions. Thus the whole of the New Zealand power boards are in co-operation with the government officials of the Hydro-Electric Department, of which F. T. M. Kissel is chief electrical engineer.

Our one object is to extend the use of electricity to the farmers as well as to the town dwellers, and in a few years time New Zealand will rank as one of the most electrified counties in the world. To indicate that progress is the growth of distribution lines from 1,909 miles in 1921 to 6,011 miles in 1925, an increase of 215 per cent in four years.

Lighting alone:
9d. (18c.) per kw.-hr.
Minimum charge, 5s. ($1.22).

Lighting and small heating:
9d. (18c.) per kw.-hr. and 4½d. (9c.) for remainder.
Minimum charge, 5s. ($1.22).

Heating and cooking (separate meter):
2¾d. (5½c.) per kw.-hr.
Minimum charge, 7s. 6d. ($1.73).

Farm power (2-hp. maximum, 3 hp. permitted under certain conditions):
First 100 kw.-hr., per kw.-hr., 5½d. (11c.).
Next 100 kw.-hr., per kw.-hr., 4d. (8c.).
Remainder, per kw.-hr., 2¾d. (5½c.).
Minimum charge, 2s. 1d. (53c.) per service connection.

Water heating in dairies:
Flat rate, 600-watt heater on double-throw switch with motor, 7s. 6d. ($1.82).

Domestic water heating:
Flat rate, 500-watt heater on double-throw switch with range or lights, 8s. 4d. ($2.02).
Continuous use 2s. (49c.) per 100 watts installed.
All foregoing unit rates are subject to 1d. (2c.) prompt payment discount per kilowatt-hour.

Large consumers:*
£1 ($4.86) per kva. for first 25 kva. of demand.
16s. 8d. ($4.04) per kva. for next 25 kva.
13s. 4d. ($3.24) per kva. for next 50 kva.
10s. ($2.43) per kva. for next 50 kva.
6s. 8d. ($1.62) per kva. for remainder.
Plus 0.5d. (1.0c.) per kw.-hr. for first 41,667 kw.-hr.
Plus 0.4d. (0.8c.) per kw.-hr. for next 41,667 kw.-hr.
Plus 0.3d. (0.6c.) per kw.-hr. for next 41,666 kw.-hr.
Plus 0.25d. (0.5c.) per kw.-hr. for balance.
Minimum charge, £15 ($72.90).

*Rates are quoted per quarter, but are here stated per month for comparison.

Getting Material to the Job on Time

Simple and Comprehensive Set of Forms Which Insures Adequate Supply of Material When Required by Progress of Work—Obviates Lost Time and Piecemeal Construction

By K. B. Crawford
Transmission Supervisor Pennsylvania-Ohio Power & Light Company

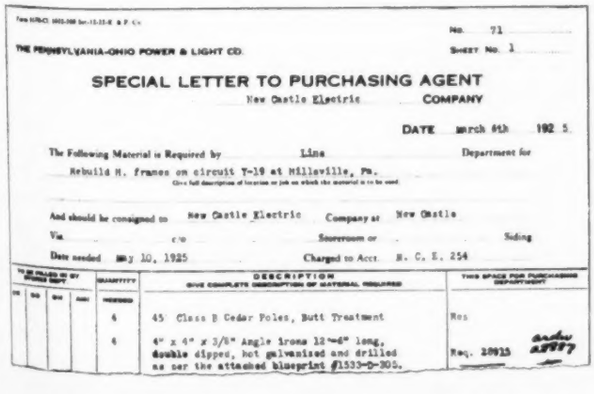
EFFICIENT methods mean lower cost and better work. Large construction or rebuilding jobs on overhead lines—or any other jobs—cannot be done in a piecemeal manner and give satisfaction. Construction crews are at a disadvantage if it is necessary to return to a job several times at widely separated intervals before completing any piece of work. In doing a large job there must be more to material collection than merely backing the truck up to a storeroom and getting a load, if it is expected to have all of the proper material at one time.

It would be very nice for the person in charge of construction if all kinds of equipment were carried in the regular stockroom in sufficient amounts to cover new work as it came up from time to time. However, this is practically impossible, for it would cause the carrying of many thousands of dollars of stock, as the material used on large construction jobs is of the slow turnover class. It would also mean a storeroom of much larger size than usually is available.

It is the policy of most stores departments to carry sufficient material without overstocking to any great extent. The needs of the various departments are usually anticipated for about three months in advance. By carrying stock in this manner there is ample time to replenish stock and overstocking is avoided. Standard items are contracted for by the year with delivery quarterly.

Methods for Provision of Material

An efficient method for doing large jobs can be divided as follows: First, the survey; second, making the estimate on the cost; third, collecting or making the necessary drawings and blueprints; fourth, notifying the purchasing and stores department of the material required (the routine of this notification, special letter to purchasing agent, will be described in the following paragraphs); fifth, checking and following up the orders and receipt of the material; sixth, notifying the superintendent in charge of construction that all material is on hand and he can make delivery of material and start the work.



THE PENNSYLVANIA-OHIO POWER & LIGHT CO. No. 71 SHEET No. 1

SPECIAL LETTER TO PURCHASING AGENT
New Castle Electric COMPANY

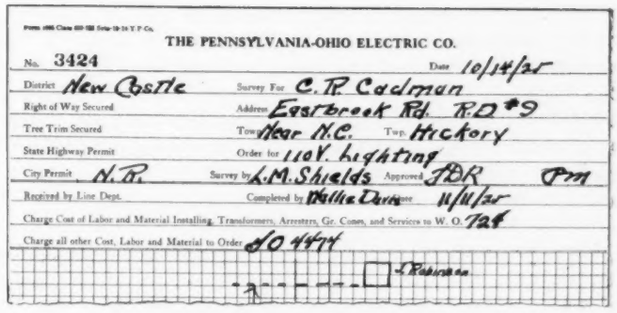
DATE March 6th 192 5

The Following Material is Required by Line Department for
Rebuild H. Frances on circuit T-19 at Milleville, Pa.
Give full description of location or job on which the material is to be used.

And should be consigned to New Castle Electric Company at New Castle
Via c/o Storeroom or Siding
Date needed May 10, 1925 Charged to Acct. H. C. E. 254

QUANTITY NEEDED	DESCRIPTION GIVE COMPLETE DESCRIPTION OF MATERIAL REQUIRED	THIS SPACE FOR PURCHASING DEPARTMENT
6	45' Class B Cedar Poles, Butt Treatment	Req
6	4" x 4" x 3/8" Angle Irons 12'-6" long, double dipped, hot galvanized and drilled as per the attached blueprint #1533-D-305.	Req. 28915 order A2917

FIG. 1—SPECIAL LETTER MATERIAL DEMAND FORM



THE PENNSYLVANIA-OHIO ELECTRIC CO.

No. 3424 Date 10/14/25
District New Castle Survey For C. R. Cadman
Right of Way Secured Address Eastbrook Rd. R.D. #9
Tree Trim Secured Town Near N.C. Twp. Hickory
State Highway Permit Order for 110V. lighting
City Permit N.R. Survey by L.M. Shields Approved JDR Pm
Received by Line Dept. Completed by Walter Davis 11/11/25
Charge Cost of Labor and Material Installing, Transformers, Arresters, Gr. Cones, and Services to W. O. 728
Charge all other Cost, Labor and Material to Order #O 4494

FIG. 2—FORM USED FOR SMALL JOBS

On smaller work, such as primary line construction, it is much simpler. First, a sketch is made, showing what work is to be done, and the material required is written on the back of the sketch, together with the complete cost. Next the sketch is approved as to the sufficiency of the material and for the correct charge account. Finally, when all is approved, the sketch is sent to the superintendent, being his notification that he may draw this material from stock and go ahead with the work.

The special letter to the purchasing department is on a printed form as shown in Fig. 1 with spaces for all essential information and notations: name of department originating order, nature and location of job, consignment and routing of material, date material is needed, account number, itemized list and complete description of material; notations by stores department as to amounts of material on hand, on order, on requisition, inventoried; notations by purchasing department giving requisition and order numbers for material not on hand; and names of persons concerned in the transaction.

This is made in five copies; three go to the purchasing and stores department, one to the superintendent doing the work and the last one is retained for the originator's file. When this letter is received by the purchasing and stores department, all notations are made on all three copies, as is shown in Fig. 1. Any blueprints for the drilling of steel or relative to the material are attached to the letter in triplicate, to be forwarded to the manufacturer. When all orders are placed and the material already in stores is reserved for this special job, the order numbers and other notations are made on the letter and one copy is returned to the originator. He then knows just what action has been taken, and as he gets a copy of all orders, he can easily note to whom the order was given and the details of each order.

The special letter shows just when the material is required. Several days prior to this the originator notifies the general storekeeper to collect the material called for in this special letter. The material is then assembled in the storeroom and on the date needed can be shipped to the place of construction. Such material as is ordered direct from the manufacturer is shipped direct to the construction site.

By this method the construction crew is not delayed by lack of material that is not in regular stock and such material as is in regular stock can be withdrawn in ample time for the stores department to replenish the supplies.

Smaller construction and maintenance work is ordered on the form shown in Fig. 2. The work is shown by a sketch on the front of the sheet and on the reverse side the material is given under its proper account number. This form is made out in three copies. None of these goes to the stores department, but the amounts of material are checked to see whether sufficient stock is on hand to do the work.

A material received slip is filled out for all material that enters the storeroom. If this material is for some special job, that fact is noted on the face and prevents its withdrawal for some other job.

All of these methods have been in force for a number of years with this company and have been found to be efficient. They decrease the loss of time and make work go on smoothly.

Cincinnati Develops New Idea in Selling

The Union Gas & Electric Company Takes the Leadership in Unique Co-operative Selling Campaign Under the Auspices of Cincinnati Electric Club—Two Drives in Commercial and Industrial Lighting Produce Remarkable Results

THE past year has seen a very interesting experiment worked out in Cincinnati in applying co-operation to direct sales. Involved in it have been the Cincinnati Electric Club—which is a local league organization—the Union Gas & Electric Company and various electrical contractors, dealers, jobbers and manufacturers of the city. The experiment has proved that the league idea has immediate possibilities beyond the belief of most electrical men and it is agreed that the local league is helping mightily to make the electrical family of a community co-operate in thinking and in planning their policies and market development programs. Well, in Cincinnati the league has organized and operated direct sales campaigns that have brought astonishing results in terms of profits to the firms whose men did the selling and in added load on the central-station lines. It all began last May with a drive for commercial lighting.

There are two conspicuous schools of thought in the electric light and power industry as regards its relations with the local electrical trade. A few prominent companies and a certain number of small ones believe that the central station should stay out of the merchandising field and not compete in any way with local contractor-dealers. A great many other companies feel that if the job is to be done at all the central station has got to set up a dominant selling activity, leaving the dealer to adjust himself to it. The Union Gas & Electric Company has taken the more constructive middle course and assumed the leadership, under the auspices of the Cincinnati Electric Club, in the organization and operation of co-operative sales campaigns in which all branches of the local electrical industry participated.

STORE LIGHTING FIRST

This idea of putting co-operation to work in direct selling was tried out first in a store-lighting campaign. When the plan had been approved by the central station and by the local jobbers' association, a meeting of the club was called and the program submitted in detail. Every member of the club was invited to take part and to assign salesmen. Twenty-nine men were entered by nineteen houses. Six jobbers entered thirteen men. Three contractors entered four men. Six dealers entered twelve men. These men were immediately organized into a campaign crew and were given a course of instruction in selling—a permanent asset, because these men would be better salesmen thereafter. When the selling started, meetings were held each morning when prospects were given out, twelve names to a street. The next morning each man would report sales and receive as many new names as he had made calls the day previous, but would retain the names of those not yet called on. These prospect lists and the sales made were the property of each man. Lists were drawn from a box. Any man might draw the pet customer of one of the others, but he handled the call. He was not restricted, however, to those names only. After calling on a store he was at liberty to drop into the store next door. Every man therefore had a wide open opportunity and results were in proportion to the work put into it. Any participation by the electric shop of the central station was on the same basis as all other dealers.

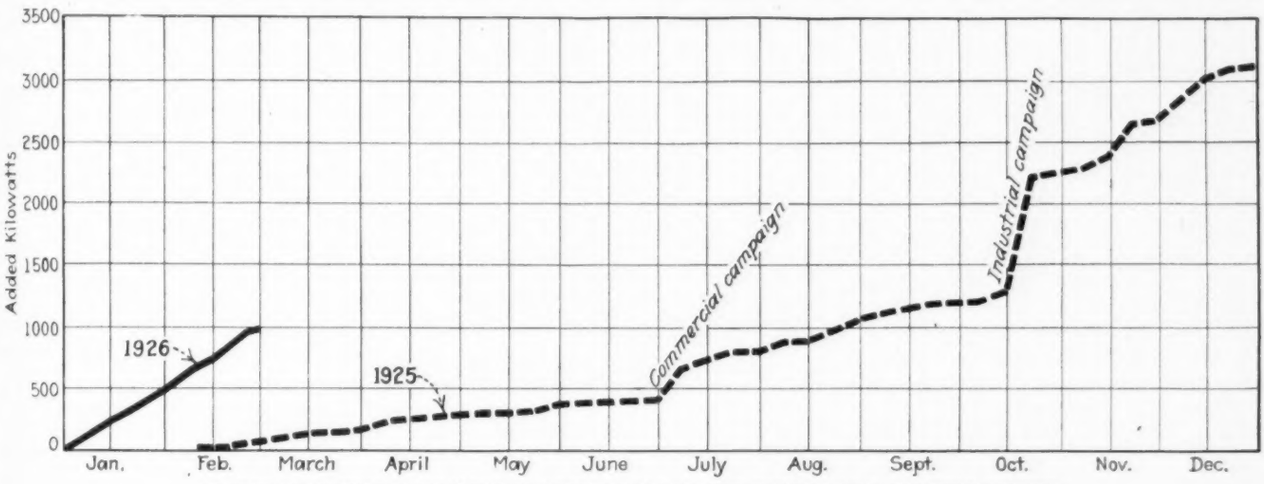
Each morning the meeting was addressed by the head of one of the companies participating in the campaign or by a manufacturers' representative—one inspirational talk each day. The men could not come out of it without learning something and gaining in spirit. None of these employees contributed any money or management. The Union company paid for all the advertising, promotion and management expense, tying in the manufacturers of lighting equipment by turning over to them the names of prospects who needed following up with lamp or reflector arguments, and in turn the salesmen's calls were co-ordinated with these mailings.

CONDENSED REPORT ON CINCINNATI CO-OPERATIVE STORE-LIGHTING CAMPAIGN

Salesman	Representing	Calls	Trials	Sales	Wattage	Units	Prospects
Fred Ausdenmoore	Beltzhoover	263	6	15	48,525	323	40
Ed Tucker	F. D. Lawrence	314	2	9	150,000	984	50
F. Andredge	Western Elec.	64	1	10	14,000	48	10
P. J. Williams	Post-Glover	178	7	7	40,425	196	32
R. Creaghead	Creaghead Eng.	113	11	9	11,850	67	24
S. P. Wittkind	Electric Shop	69	0	14	9,600	47	30
Brocksmith	Electric Shop	71	1	3	1,100	9	20
Sayres	Electric Shop	206	6	...	.....	.....	2
King	Electric Shop	70	..	...	.....	.....	...
O. J. Brown	Milner Elec.	278	3	17	38,700	211	40
E. C. Huerkamp	Johnson Elec.	121	12	22	107,325	618	23
E. O. Koch	Enterprise Co.	54	0	1	240	6	00
Smith	Enterprise Co.	37	..	1	200	1	20
J. Rehm	Devere Elec.	220	7	17	22,800	107	26
Stock	Devere Elec.	96	1	11	135,200	1,309	...
Van Valsel	Doerman-Roehrer	324	3	2	10,500	7	39
A. Huber	Huber Elec.	337	3	3	3,450	12	...
F. Waag	Huber Elec.	144	3	4	700	6	65
M. P. Schafer	Veith Co.	129	5	4	6,375	35	20
J. O'Keefe	Western Elec.	152	3	4	6,700	61	25
J. Neal	Western Elec.	16	2	...	.....	.....	10
C. W. Foerst	Western Elec.	42	..	...	.....	.....	20
I. S. Holden	Holden Bros.	106	3	5	6,950	31	20
Ernst Braun	Holden Bros.	193	4	3	9,100	42	8
C. E. Dimmitt	Johnson Elec.	15	..	2	3,600	15	...
H. C. Maxwell	Post-Glover	72	..	1	900	9	...
F. C. Hayes	Post-Glover	73	..	3	10,000	126	...
Goiger	Humphrey Fix	193	..	4	4,100	23	15
Kelly	Kelly Elec.	12	..	1	15,000	30	6
Miscellaneous	.....	302	..	18	84,025	706	55
		4,264	83	190	728,365	5,029	600

It was a well-co-ordinated program. The proof of this is that despite the fact that the weather was excessively hot much of the time and daylight saving time relieved the merchants of much lighting, 4,254 persons were called on, resulting in 600 prospects; 5,029 store or window lighting units were sold, with a total wattage of 728,365.

Meanwhile both jobbers and dealers almost doubled their normal seasonal sales of store-lighting equipment. Great interest in the subject was created, so that several local retail merchants' associations held special demonstrations for the members and the appearance of the city's shopping streets was very noticeably improved by the higher standard of illumination effected. And it is interesting to note that this work was carried out by volunteers, each of whom took on this job in combination with his regular job. It speaks well for the management that such a crew could be tied together. Some men liked the idea because they saw the opportunity it offered. Others resented being turned over to a strange boss. A few who did not fit dropped out. But the turnover of salesmen was small. The participating employers were kept constantly advised of the progress of the campaign and when the drive was over a report was submitted as summarized in the accompanying table.



EFFECT OF SPECIAL CAMPAIGNS IN ADDING LOAD TO THE UNION GAS & ELECTRIC SYSTEM

These results were so satisfactory that the Cincinnati Electric Club immediately organized a co-operative industrial lighting campaign on the same basis of leadership, tying in with the national industrial lighting campaign. The publicity and promotion work began at the end of July and a series of meetings was held during August and the fore part of September. The same process of organization was followed as before and the local employers were asked for ten salesmen. They sent 32 to the first sales meeting on Oct. 20. Six jobbers sent eighteen men. Five contractors sent eight men. One fixture dealer sent four men. The Union Gas & Electric Company entered two men in the crew. That made thirteen houses participating. Meanwhile many of these salesmen had been under instruction. On Sept. 14, for instance, 25 men were sent to Nela Park for a day's schooling. Twenty of these men had already had the experience of the commercial lighting campaign. The Union company provided the publicity as before and because the work of calling upon factories and making recommendations was so much slower than selling to stores, morning meetings were held once a week and ten prospect cards were assigned to each man instead of lists of twelve, as had been the practice. The regular promotional matter of the national industrial lighting campaign was tied into the work and the standard broadside and three folders were sent out in advance of all calls. Special newspaper advertisements were prepared. The salesmen agreed to call on all prospects given out, but were allowed to ask for any special cards that they had reason to desire. When a salesman found an interested prospect that required a survey, he reported to the Union company's lighting service department and a blueprint layout and a report was provided. This was given to the salesman, who took it to the prospect in a special cover marked "Cincinnati Electric Club" and he made the sale. The campaign publicity also carried the Electric Club's name, and the independent advertising of jobbers and manufacturers was closely tied into the drive.

The weekly sales meetings were highly inspirational. The men gathered at 8:30 and reported the sales of the previous week. For every contract closed they rang a bell and on a clever transparency affair shot off a gun and hit the bull's eye and the score was chalked up on a big blackboard. Then there was a discussion of problems the salesmen had met and it wound up with an inspirational talk.

The men were able to call on about two prospects a day in this industrial lighting campaign as against twelve calls on the store-lighting drive—this still in addition to their regular work. So well has the work been done that a high degree of enthusiasm has been maintained despite the fact that these men worked on this job but part of their time and were serving a boss who did not control their pay. And under these very unusual conditions, up to the end of March, the industrial campaign had achieved the total of 1,456 prospects, 1,723 calls made, 52 surveys submitted, 679 contracts closed, embracing 15,909 industrial lighting units sold, aggregating 1,777 kw. in increased load upon the power lines. What this has meant to the Union Gas & Electric Company is graphically shown by the accompanying curve. The comparison of the growth of load previous to the institution of co-operative selling and since the organization of the co-operative campaign is certainly dramatic.

Those concerns that took part in these campaigns have benefited richly and thoroughly approve of this plan of operation. Here is something new in practical co-operation among electrical men, and by all the evidence it is something distinctly good.

Group vs. Individual Drive

Views of Four Engineers Who Have Had Considerable Contact with Industrial Practices—Factors to Consider in Adopting One Drive or the Other or a Combination

FOUR power-sales engineers of an electric light and power company that handles considerable industrial business have been sounded for their viewpoints and observations on group versus individual drive by the question, "Is group driving on its last legs?"

One engineer replied, "Group driving is not on its last legs nor will it ever be." Another declared, "There is not now nor will there ever be a hard-and-fast rule that will govern either type of installation. Both have their advantages and disadvantages. The type of work to be done will be the deciding factor."

Expressed in a different way, a third engineer pointed out: "In certain classes of industry, such as textile and machine shops, especially those involving light machines, there is a tendency toward group drive, but in the granite, quarry, steel mill and like industries the tendency is toward individual drive. Speaking generally, individual drive predominates except in a few industries where the manufacturing processes and methods of operation require that all equipment be run at the same time, as in a number of flour mills and like industries. However, the tendency of these flour mills is to sectionalize their operations rather than to complete their entire manufacturing processes by means of one large source of power."

"No system of mechanical drive can be installed," says the fourth engineer, "without taking into consideration energy loss due to friction, and maintenance of the transmission system. The balance point will fall where the energy loss in dollars equals the maintenance and friction losses similarly evaluated. However, such a design has its limits in that it might be possible to create a plant that would be so unsightly that what is gained in economy of energy is lost in space and general appearance."

Three examples of the futility of group drive under certain conditions were cited. One involved a mill in which the old group drive from a steam engine had a friction load of 200.5 hp.—about 40 per cent of the full-load running power requirements. "Undoubtedly," said the engineer, "application of group motor drive to such an installation would be foolhardy. The owners of the mill recognize this fact and if it is ever remodeled the drive will be rearranged and the transmission links considerably shortened."

Another example involved a brick plant in which a 200-hp. motor was used to drive the entire mill with its long line shafts, numerous friction clutches, idle pulleys and belts. In a similar installation the load is being gradually taken off the line shaft and distributed among smaller groups and even some individual drives. This sectionalization is being effected because, with the single power source, breaking of a belt, which occurred frequently, shuts down practically every unit.

Life hazards from unprotected belts and obstruction to proper lighting by extensive group drive were also emphasized. "Line shafts are generally carried overhead," it was pointed out, "and the belts run vertically to machines. This condition prevents efficient illumination and allows belt slippage, which may result in excessive belt maintenance or replacements.

"On the other hand, individual motor drive saves space, will not interfere with good lighting, minimizes hazards and offers a great opportunity for power economies. If the plant superintendent cares to dig deeply into his problem, he can train machinists to operate their respective machines to obtain the maximum power at a minimum cost."

"In plants where practically all machines must operate constantly," declared one of the engineers consulted, "group driving should be given consideration, especially where the first cost is paramount. Where the operations are varied and each of short duration, individual drive appears to be better."

"If an analysis suggested by the accompanying factors shows a new form of drive is favorable," said one of the engineers interviewed, "it is then important to ascertain just how far it is feasible to utilize the new drive. The following conditions must be considered:

"1. *Type of Building.*—Old-fashioned buildings usually have poor natural lighting facilities. The presence of belts, belt shifter rods, line shafts and pulleys will interfere with lighting and hence with production.

"2. *Type of Machinery.*—Considerable machinery (such as wood working, for working up quarry or mine products, old machine shops, etc.) has been designed for belt drive from line shafts.

"3. *Manufacturing Operation Involved.*—Some operations are strictly consecutive, and machines are so located to do this work or adjacent machines may perform operations not at all related.

"4. *Diversity of Manufacture.*—In some plants making diverse products or which have grown up like 'Topsy,' certain processes or operations are not related, and consecutive operations are performed by widely separated machines.

"5. *Growth of Plant.* — Compare last few years with present rate of growth.

"6. *Character of Location.*—Nature and aggressiveness of town; whether on railroad track, etc.

"7. *Competition.* — Is present production in competition with other plants?"

Studies will establish which drive is suitable.

Some Factors to Consider in Industrial Drives

Power lost from source to point of utilization.

Cost of belt or rope renewals and repairs.

Cost of line-shaft bearing renewals and repairs.

Cost of lubricating line-shaft bearings.

Interest, depreciation and insurance on first cost of line-shaft layout, including prime movers and transmission components.

Cost of power delivered to belt or rope wheel of prime mover.

Value of space occupied by prime mover and its drive.

Value of space occupied by line shaft and secondary drive.

Loss of production due to obstructed light.

Loss of production due to repairs on line shaft or driving apparatus.

Total unit cost of production in terms of power cost.

Operating a Concentrated Power System

Functions of Load Dispatcher—Sixty-Cycle Load Dispatching More Complicated than 25-Cycle—Load Schedules and Automatic Load Totalizing Help—Protecting Service from Bus Short Circuits—Safeguarding Downtown Supply

By P. B. JUHNKE
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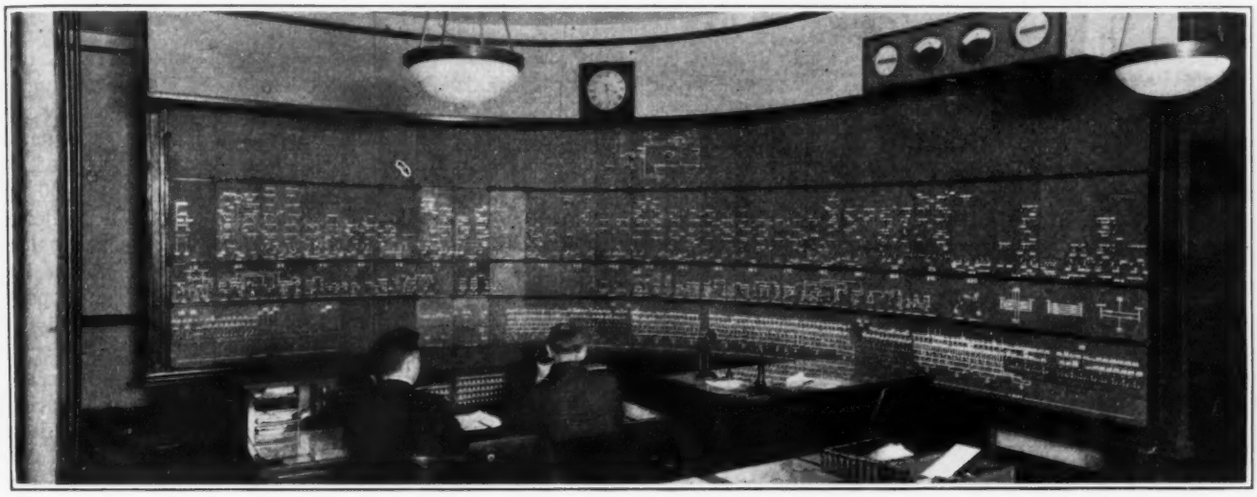


LOAD DISPATCHERS AT WORK IN CENTRAL OFFICE

MAINTENANCE of continuous service and economy of operation in a concentrated power zone do not involve some of the problems that are encountered in a system extending over considerable territory with exposed transmission lines and widely separated generating stations, but they do involve the problems imposed by massed generation and utilization of power where interruptions of service may create greater inconvenience, and may be of more serious consequence. The concentrated power area considered is that of metropolitan Chicago, which lies virtually within a semicircle, with its diameter along the lake shore and a radius of approximately fifteen miles, in which there is a load of approximately 800,000 kw. and a generating capacity of approximately 900,000 kw. Furthermore, the Commonwealth Edison Company system, which supplies this territory, is the principal member of the great territorial power pool, with a radius of 50 miles and aggregating approximately 1,100,000 kw., with very much larger interchanges between its members.

Relation of Load Dispatcher to System

Executive and technical responsibility for the constituent parts of the system, such as generating stations, substations, transmission and distribution structures, belongs to the organizations under which they are grouped, and these organizations are fully qualified to handle their respective problems. Collectively, however, they have a common purpose, the system in its entirety, over which the load dispatcher is delegated to guard against anything interfering with the continuous flow of energy from the station bus to the customer. All physical equipment of the system is considered at all times in service or available for service. To render any part unavailable for immediate service requires the load dispatcher's permission. This is also required for the putting back in service of this equipment, since safeguarding the men engaged in the work as well as service continuity must be considered. Of necessity, the load dispatcher is provided with sufficient authority to co-ordinate the efforts of the constituent parts in the common cause not only under normal conditions but also when impairment of service is threatened and when, for tactical reasons, the service may have to be partly sacrificed to avoid greater trouble.

To obtain a closer perspective of the load dispatcher's duty, it is desirable to consider the 25-cycle and 60-cycle systems separately, these systems not being interconnected at present, although an interconnection is planned for the near future.

The 25-cycle generating system (Fig. 1), which is employed to supply the greater portion of the Edison three-wire direct-current service to a total of about 125,000 kw. and transportation service to a total of about 225,000 kw., has now reached a rating of about 375,000 kw. in generator capacity, to which it most likely will be limited indefinitely.

Load dispatching on this system is comparatively simple. The street-railway load varies comparatively little from day to day and the hourly changes are well known in advance. Variations are due largely to cold weather, which is never so sudden in its appearance as not to permit of adequate preparation, the average variation between summer and winter load being approximately 50,000 kw. Sudden increases may be due to

the Edison direct-current load, caused by dark spells; but this is scarcely in excess of 15 per cent of the total carried on a normal day.

A simple plan of operation is used for this system, calling for the loading of the most efficient units, totaling approximately 120,000 kw., to the exclusion of the older equipment. About half of the highly efficient capacity is situated in Northwest station and the other

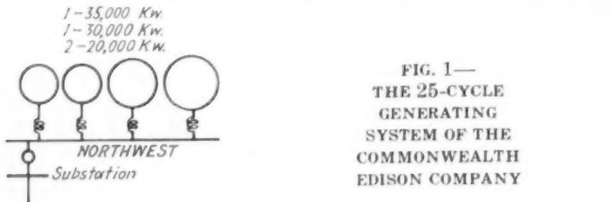


FIG. 1—THE 25-CYCLE GENERATING SYSTEM OF THE COMMONWEALTH EDISON COMPANY

half in Fisk Street station. The interchange between the generating stations is relatively simple, because the stations having highly efficient generating capacity have load in excess of it about eighteen hours per day.

When the most efficient generating capacity is in excess of the load available, the situation is handled by simple regulation of the power which the station with an idle excess of highly efficient generating capacity may feed into other stations having less efficient capacity up to the limit of load on such units or the capacity of the tie lines. Otherwise each station chief engineer is free to carry his own connected load up to the limit of his capacity with any units desired, the responsibility for efficient station operation at the load assigned resting with him.

The routine of load dispatching on this system concerns itself chiefly with incidental switching in connection with work in stations or on the transmission lines. Trouble is relatively infrequent, due perhaps to the fairly low operating voltage and the absence of extension work.

Current-limiting reactors are employed to split up this system into four sections. The tie lines or reactor ties between sections are provided with overload relays; similar provision is made for the reactors between the two sections at Fisk Street. Although these reactors limit the interchange between a section in trouble and any other section to a maximum of about 100,000 kva., it is nevertheless realized that such an amount of energy drawn from a section not directly in trouble will reduce its pressure to a point where synchronous apparatus will "fall out of step." For this reason all section ties between Fisk and Quarry Streets are protected with differentially balanced relays to protect the cable, and also with an overload relay to clear a section in trouble in case of a prolonged short circuit.

60-Cycle Dispatching More Complicated

The load growth of the entire city is being absorbed by the 60-cycle generating system (Fig. 2). This is being accomplished by picking up, through 60-cycle railway and Edison three-wire rotary converters, all growth of load in the districts formerly supplied by the 25-cycle system and by giving new customers in the outlying direct-current territory 60-cycle service. This practice accounts for the annual load increase of about 15 to 20 per cent on the 60-cycle system, compared with a total load increase of about 10 per cent per annum for the combined system.

Serving this system are six turbo-generator stations, ranging in size from 14,000 kw. to 187,000 kw., situated in different parts of the city with a maximum separation of about 21 miles. With the exception of Quarry and Grove Streets stations, these stations are all of the latest type, having a B.t.u. rate of 16,000 to 20,000 per kilowatt-hour. The difference in coal rate is sufficient to make it a problem of considerable concern to load the most efficient stations to the exclusion of the less efficient ones, which are relegated to the rank of peak-load stations.

The basic method of operating the 60-cycle system is vastly more complicated than that of the 25-cycle system. This is due to the fact that the newest stations have only relatively small local loads and depend for large portions of their output upon tie lines to older stations. At the latter stations the capacity consists only to a small extent of highly efficient units, thereby making it doubly important to effect a large amount of interchange between them and the latest stations.

Crawford and Calumet stations, having, in the order named, the best coal economies, are being loaded, in addition to their local load, by output over tie lines into Fisk, Quarry and Northwest zones. The tie line capacity from Calumet north to the Fisk-Quarry zone is about 60,000 kva., that from Crawford to Fisk-Quarry zone 40,000 kva. and that from Crawford to Northwest zone 35,000 kva. When these tie lines are carrying load in directions away from Calumet and Crawford stations to the limit of their capacity and consistent with ample protection of the receiving centers the system is being operated at the maximum possible efficiency.

Load Schedule Assists Division of Load

This principle is embodied in the operating schedule prepared by the load dispatcher's office and given to the generating department. The schedule aims to take care of variations in load for different hours of the day. For instance, at 10 a.m. on weekdays the 60-cycle system load varies ordinarily between 300,000 and 350,000 kw. For this particular time the loads assigned to the stations are as follows:

Station	Load Kw.
Waukegan interconnection	10,000
Northwest	30,000
Fisk Street	35,000
Crawford Avenue	110,000 to 130,000
Quarry Street (peak load station)	0
Grove Street (peak load station)	0
Calumet	115,000 to 145,000

The values assigned to Fisk and Northwest are the minimum values for protection of these centers.

Divisions of load for other hours of the day are similarly provided and schedules are issued for different days as follows: (1) For the average weekday; (2) extremely light weekdays, such as those following holidays; (3) Sundays and holidays; (4) Saturday afternoons.

The schedules are changed periodically, as the change in season makes different load limits appear necessary for different hours. All of these schedules specify further that, as practically peak-load conditions may be encountered at any hour during the day, peak-load distribution shall prevail in such an event.

The schedules described serve as one method of handling the problem of load division between stations, but they are far from ideal for all purposes. Another method that could be considered is for the load dispatcher to secure periodically the total demand on the system and to advise each station of this total. This then is to be apportioned among stations according to the schedule previously furnished. This plan, so long as it is dependent upon telephone communication, has the drawback that it does not provide each station with a guide to changing load conditions.

AUTOMATIC LOAD TOTALIZING SIMPLIFIES PROBLEM

To meet this need there is now being installed in the load dispatcher's office an automatic load-totalizing system, which will collect the individual station loads and combine them into a grand total. Each system total will then be retransmitted to the generating stations, which previously will have been given a schedule showing their respective portions.

This arrangement will make it necessary for the load dispatcher to deal only with the preparation of the load-division schedules, which will require changing only as the generating capacity of any station changes. Thereby routine dispatching will be made practically automatic, and the load dispatcher will be relieved for other work that does not lend itself to mechanical disposition. Only one pair of telephone wires is required between each generating station and the load dispatcher's office for collecting and retransmitting the data and will be used exclusively for this purpose.

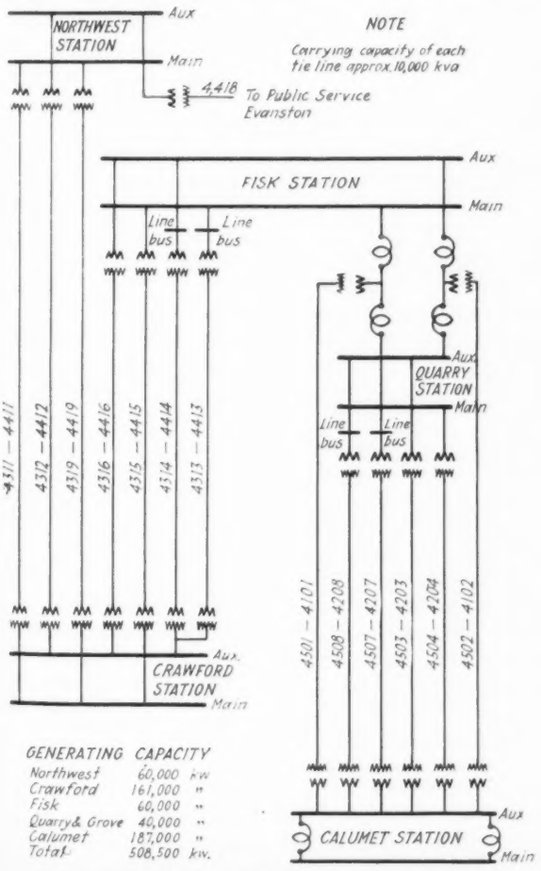


FIG. 2—THE 60-CYCLE GENERATING SYSTEM AND STATION INTERCONNECTIONS

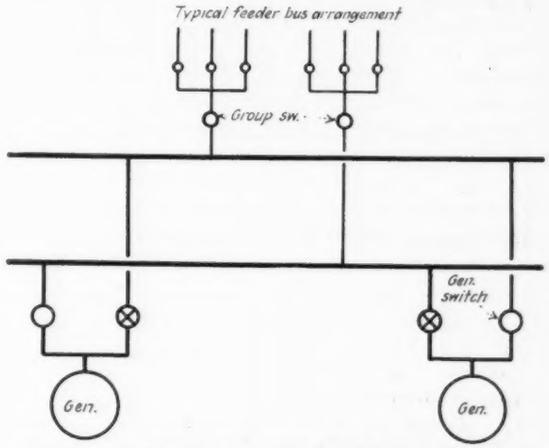


FIG. 3—AUTOMATIC BUS SECTIONALIZATION SCHEME

Employed to isolate bus trouble. Generators are normally closed to both buses. The generator switch marked with x opens automatically in case of bus trouble, leaving one-half of the generators on each main bus. In such an event all of the load on the bus in trouble would be lost, but the other generators will continue to supply their load.

Every effort has been made to facilitate the elimination of faulty sections in a station bus by (1) limiting interconnections to relatively few members; (2) automatic sectionalization of station buses into at least two major sections, assuring the continuity of service on at least one-half of the station (Fig. 3), and (3) further manual sectionalization in successive steps on the defective bus in accordance with a predetermined procedure, aiming at rapid division of the bus until the trouble is isolated. The bus sectionalization scheme shown is now in use in four of the five principal generating stations and is of interest pending installation of a complete bus-sectionalizing system designed to cut out any defective bus section. Since the loads normally fed by two main buses must not be connected outside the station, this form of isolation has been applied throughout the entire 60-cycle system.

Since the transmission and distribution systems constitute one of the most important links in the chain between the generating station and the customer, they are given the maximum attention by the load dispatcher. He stands guard to see that the transmission lines are not overloaded; that no element of either the transmission or the distribution system is operated without his permission, except in cases of trouble when automatic protective devices come into action; that all routine switching is performed only under his specific orders, whether it be on the transmission system, on the 4,000/2,300-volt distribution circuits or on 220-volt direct-current feeders.

In the case of substations, the load dispatcher concerns himself primarily with continuous alternating-current supply. This requirement involves not only keeping the lines to each substation closed but limiting excessive supply over any one line to a substation

center so that no part will be strained or jeopardized and continuity of service threatened. Putting on or taking off of converting and transforming equipment is left to the operators of the individual substation.

The load dispatcher's operating routine includes the maintenance of pressure standards in the direct-current territory, load division on all outgoing feeders and the maintenance of specified pressures at each point. Every eight days a feeder report is made indicating the number and size of each feeder and showing the load and feeder-end voltages on all feeders at 1 a.m., 11 a.m., 5 p.m. and 8 p.m. By means of these readings and feeder layouts, an intelligent basis can be established for distributing the feeders among buses.

Division of load among a relatively large number of substations on this system does not require a great deal of supervision. The maintenance of proper pressure standards in the vicinity of each substation seems to secure for each its proper share of the total load. The absence of very large surplus capacity in any substation and the lack of constant necessity to use surplus capacity of one substation to relieve another permit supplying the direct-current system without excessive supervision or regulation.

Considerably less attention is given the 60-cycle and railway substations by the load dispatcher. Besides watching over the alternating-current supply, the supervision is limited to routine switching in connection with work in progress.

Recently the Commonwealth Edison Company became a party to a contract governing interconnection and interchange with the Public Service Company of Northern Illinois and the Northern Indiana Gas & Electric Company. This contract makes any one company's reserve available for the other, enables a much smaller total reserve, facilitates free interchange of energy practically at cost, permits operation of the most efficient station to the exclusion of others, irrespective of ownership, and allows the smaller companies to build the largest and most efficient stations without risk of having them remain idle for any length of time. The contract has been in operation for almost a year and so far has given a very good account of itself. The outstanding features of this contract would be a profitable subject in itself for intensive study.

A private telephone switchboard supplied and maintained by the Bell company with lines and extensions to all generating stations and attended substations, totaling about 85, is available for quick communication. Unattended substations are provided only with exchange telephones and large customer transformer vaults have their own exchange instruments. To receive calls from these customers the load dispatcher's board has several trunks, which are placed on a different exchange from the exchange serving the Edison company. This is done because, in the event of extended service interruption, the Edison trunk lines might become so congested that it would be impossible to reach the company readily; this is not the case with any other exchange trunks. Because of these facilities the load dispatcher is relatively much better situated than his brother in an extended and less-concentrated system.

A system diagram is maintained on a semicircular board, divided into numbered panels. The upper ones are allotted to substations and the lower ones to generating stations. Paper strip pasters indicate bus structures and drilled holes surrounded by circular gummed paper cutouts denote switch structures, plugs being inserted to indicate closed switches. Indication of switch position has purposely not been made automatic, partly because of the relatively small benefits derived therefrom and partly because of the large amount of work required to make such wiring conform to the changing condition. Moreover, in a properly designed system suitably protected by automatic devices, the number of lines opening in case of trouble is relatively small. If a line is held for work and is grounded for this purpose, this fact is indicated by a red circular tag inserted in the hole denoting the oil switch.

General supervision over work in progress is delegated to the load dispatcher because of service and safety considerations, specific supervision being the function of the department doing the work. For any electrical equipment to be taken out of service or placed back in service, written permission must be obtained from the load dispatcher, because it is within his province to determine whether certain apparatus can be spared at a certain time. Moreover, the safety rules of the company make it incumbent upon the load dispatcher to see that apparatus taken out of service is not put back without the parties doing the work having reported its completion to him. Furthermore, the load dispatcher does not allow equipment to go back into service until the testing or starting engineer has personally reported it safe for regular operation. If a transmission line is out of service, he does not allow it to go back until he has been assured by the station electrician that the phase rotation is correct and that a preliminary breakdown test has been made on the cable. In the case of direct-current feeders out for cable changes, a polarity and back-feed check is required before they are ordered closed. Putting on and removing of "Hold Cards" is done only upon the load dispatcher's order. The giving of low-tension phase signals from stations or substations to men working on underground

Where the Load Dispatcher Fits In

1. All utility departments have a purpose in common—continuity of service and highest economy of operation.

2. Each department is fully qualified to handle its individual tasks.

3. Load dispatcher can co-ordinate those functions that effect combined results.

4. General supervision of work in progress is essential to continuity of service and human safety.

5. Proper physical equipment, arrangement and protection constitute half the solution to proper load dispatching.

6. Interchange and interconnection agreements have many advantages.

7. Loading most efficient units without reducing availability of adequate power at any point is chief problem.

8. Automatic load totalizing and load schedules facilitate division of load.

9. Emergency rules guide operators, who, nevertheless, still have ample opportunities to exercise initiative.

10. Load dispatching requires independent thinking, reliability, caution, good judgment, initiative, foresight, composure and alertness.

cable is likewise under the load dispatcher's supervision, as well as the paralleling of 4,000-volt distribution circuits by overhead men.

Personnel and Hours of Work

The load-dispatching force is recruited from men who have in their previous duties gained an intimate knowledge of the company's system. For acquiring such acquaintance, substation work affords an excellent opportunity. The men engaged therein are frequently shifted from place to place to perform tasks that call for a considerable amount of independent thinking. Their respective tasks are more comprehensive than, for instance, in a generating station, where, due to the presence of a greater force of men, duties are far more highly specialized and where ultimate and immediate responsibility rests with the highest men in the organization. Training in substation occupations more quickly instills judgment, reliability, caution, alertness, initiative, composure and foresight, all of which are qualities a good load dispatcher should possess in no mean degree.

Due to the intense concentration required by load-dispatching duties, the hours of work are purposely made easy. A five-day week has been devised, every sixth day being free. One of the five days is spent on the system to keep in touch with the ever-changing details. If a visiting day falls on a Sunday or holiday, the day is considered free for recreative purposes. During the summer vacation visiting days fall away. In this manner the time of a load dispatcher tallies exactly with the hours of a regular office employee.

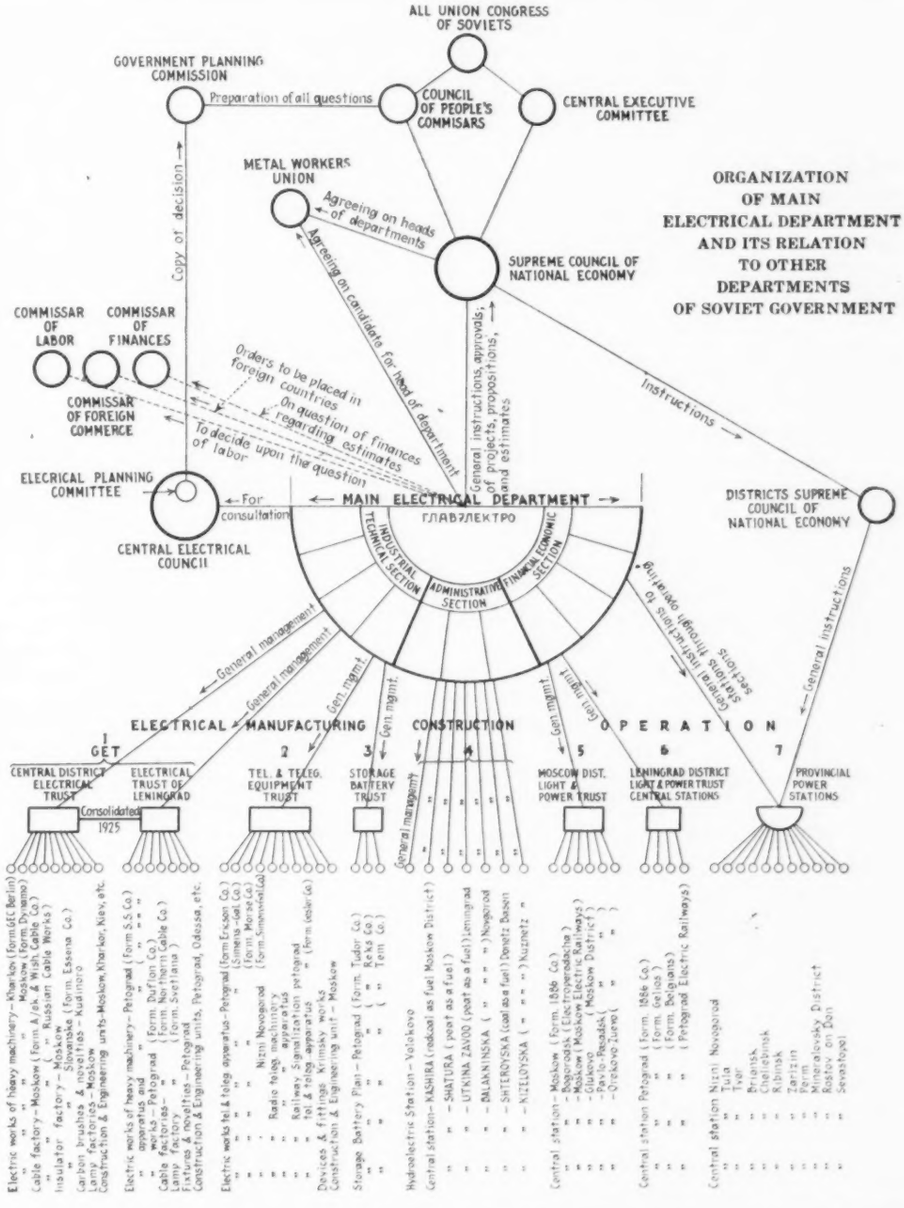
Regular meetings are held once a month, at which subjects of general interest are discussed. Sometimes a member prepares a talk or lecture on a subject requiring individual study. Periodically the meetings are turned into joint conferences with station chief electricians for discussions of common interest. Only in this manner is it possible to develop composure for trying hours and to keep the load dispatchers keen and alert in the monotony of daily routine.

As systems grow larger and interconnections increase the duties and responsibilities of the load dispatchers increase and it is necessary for them to be ever alert and physically fit.

Organization of the Electrical Industry in Russia

By B. W. Lassoff

IN PRE-WAR DAYS the majority of large power stations and electrical manufacturing plants in Russia were concessional enterprises, controlled by foreign capital, mainly German. The native electrical industry, represented by smaller plants, although backed by government credits and encouraged by various restrictions of foreign enterprises, was in no position to compete effectively with the well-equipped plants of foreign firms.



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At the outbreak of the World War all German plants were sequestrated by the government and placed under the control of the Ministry for Trade and Industry. After the first (February, 1917) revolution the tendency toward greater national economic independence asserted itself in the electrical industry by the predom-

inance of Russian capital. With the advent of the second (October, 1917) revolution the entire electrical industry was nationalized in accordance with the theses of Lenin on the electrification of Russia as a basis for the general industrial and cultural development of the country. The subsequent period of civil war, intervention by the Allies, complete economic exhaustion, breakdown of transport facilities and bad crops greatly retarded this program.

In 1921 a special committee of more than 180 prominent engineers worked out a general plan for the electrification of the Soviet Union, which at the present time comprises fifteen Soviet Socialist Republics in Europe and Asia. The plan called for the erection of 30 regional power stations in districts that represented sound economic regions for industrial development. At present seven regional stations are under construction.

The detailed treatment of this plan is being carried out by the Main Electrical Department, "Glavelectro," in control of the entire electrical industry and co-ordinating its technical activities through the medium of the Central Electrical Council, an advisory scientific body, with those of the State Planning Commission, "Gosplan," which plans the organization and development of all industries of the Soviet Union. The Main Electrical Department deals directly with the various commissariats of the government, such as the Commissariat for Foreign Trade with respect to foreign orders, the Commissariat of Finance in connection with estimates and appropriations and the Commissariat of Labor on matters pertaining to labor problems.

The department is divided into three sections: technical, administrative and financial. In comparison with other industrial departments of the Supreme Council of National Economy, the Main Electrical Department possesses extensive rights, the only other departments enjoying similar rights being the Main Metal Department, "Glavmetal," in charge of all metal industries, and the Main Fuel Department, "Glavugol," in charge of all fuel industries.

Referring to the accompanying diagram, the Main Electrical Department is in direct charge of the following organizations:

1. "G E T," or Government Electrotechnical Trust, consisting of the lately combined Leningrad and Moscow District Trusts for the manufacture and installation of electrical machinery.
2. Telephone and Telegraph Equipment Trust.
3. Storage Battery Trust.
4. Construction of Regional Power Stations.
5. Moscow District Light and Power Trust.
6. Leningrad District Light and Power Trust.
7. Provincial Power Stations.

Every trust embraces a number of industrial units, technical bureaus and trade agencies conducting commercial operations. A board of directors consisting of representatives of labor and technical experts is at the head of each trust. These boards are jointly selected by the Metal Workers Union, the Main Electrical Department and the Supreme Council of National Economy. The various trusts have been designated by the authority of the Soviet Government as the owners of all enterprises in their care, and have the right to buy, sell and trade in much the same way as privately owned commercial concerns.

In accordance with the principles governing the new economic policy introduced in 1921 the Main Electrical Department is authorized to regulate the commercial activities of the electrical trusts and to act in the capacity of an industrial board. It exercises legislative functions as regards decrees regulating the electrical industry, subject to approval and confirmation by the Council of People's Commissars chosen yearly by the Congress of the Soviet Union of Socialist Republics.

Developments in Roumania

THE progress made in electrical developments in Roumania during the last few years is quite remarkable, and the expected growth during the next few years is very promising. During the past few months conferences have taken place between Roumanian authorities and foreign engineers with regard to a systematic electrification of the entire country.

The first installation was made in 1899, when a 1,250-kva. hydro-electric station was constructed at Sinaia by the light and power company known as "Electrica." The energy generated at this station was chiefly utilized for illumination, but a small amount was also used for power in the Prahova district. More rapid progress has been made since 1906, when the 26,860-kva. steam station known as "Campina" was placed in operation.

Another steam plant, known as "Floresti," with an installed capacity of 10,500 kva., was placed in operation in 1923. This station has all of the features of a modern steam station. The boilers of the Floresti station are equipped for burning crude oil, but within a short time they will be changed to burn natural gas from the Aricesti district.

These three plants are connected by means of a 25,000-volt transmission line, 130 km. long. A 60,000-volt line supplies the city of Bucharest from the transformer station at Floresti. This year will see the completion of a new 60,000-volt line that will connect the towns of Sinaia and Brasov. A transformer station at the latter point, which is designed for an ultimate capacity of 60,000 kva., will be the feeding point for the Transylvanian industrial districts.

In order to meet the growing demand for electrical energy intensive surveys have been conducted during the past few months for the purpose of locating the best sites for the construction of hydro-electric plants. According to most accurate calculations, the hydro-electric resources of Roumania are estimated to be at least 1,100,000 kw., very little of which has been developed. Improvement of railway traffic in this country is possible only by the electrification of the state railways, and for this reason much attention is being paid to the development of the water resources. The existing transmission network of the Prahova district can easily be extended to the neighboring river districts of Teleajean, Jalomita and Tarlungul, and the coal basin of Brasov to the north of the Carpathian Mountains can be made a large consumer of electrical energy.

ENERGY USED IN ROUMANIA FOR OIL DRILLING MOTORS

	Energy Supplied for Oil Drilling Motors, Kw.-Hr.	Per Cent Increase Since 1921
1921	16,953,662	30.16
1922	22,043,999	37.60
1923	26,692,117	110.23
1924	35,605,001	292.50
1925	46,573,160	.....

Central Station and Industrial Practice

Transmission Line Chart

BY BERTRAM E. ELLSWORTH
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WITH the aid of the accompanying chart the voltage drop in a given transmission line can be quickly found. Its principal use has been to check other methods of figuring line characteristics and quickly to estimate a proposed line.

Due to the many different types of construction, the inductance and capacity of a line will vary over quite a range. An average value is found by the use of the chart, but an accuracy greater than plus or minus 0.2 per cent in the "Per Cent Voltage Drop" should not be expected. However, the resistance of copper wire varies so widely with temperature variations that extreme accuracy in figuring line characteristics does not seem advisable. The values of resistance used are for 75 deg. F.

The method of using the chart is as follows: Place a straight edge between "Wire Size" used and the "Length of Line" in miles. This will locate a point on the "Q" scale. Place straight edge from this point to the amount of power (three-phase kva. scale) to be transmitted. This will locate a point on the "S" scale. Place straight edge from this point to the "Line Voltage" to be used and the extension of this line will give the "Per Cent Voltage Drop."

The index lines shown are for a transmission line using No. 4 wire, 34 miles long, transmitting 100-kva., three-phase, 60-cycle power using 6,600 volts. The voltage drop is given as 10 per cent, which of course is excessive for a transmission line.

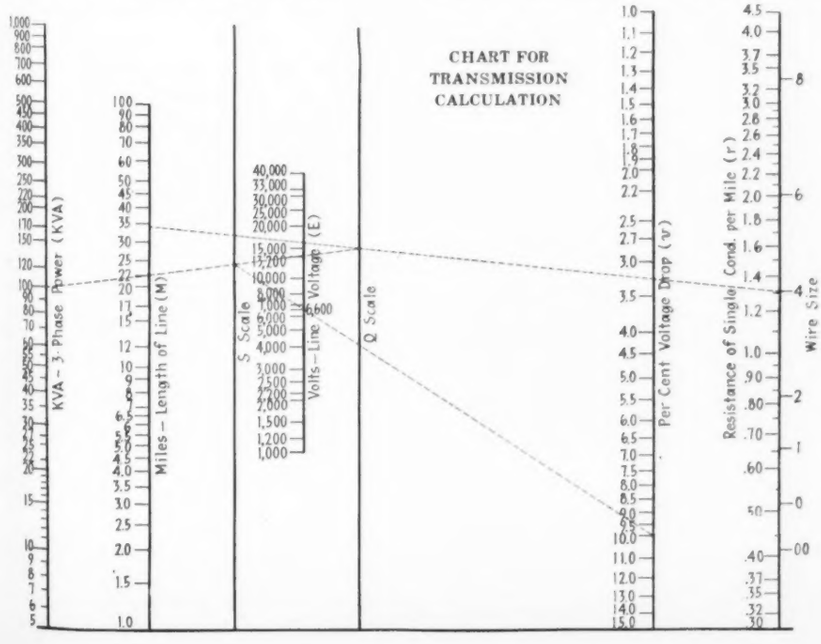


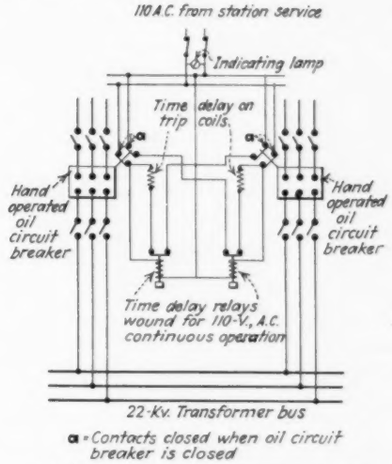
CHART FOR TRANSMISSION CALCULATION
KVA - 3 Phase Power (KVA)
Miles - Length of Line (M)
S Scale
Volts - Line Voltage (E)
Q Scale
Per Cent Voltage Drop (w)
Resistance of Single Cond. per Mile (r)
Wire Size
6,600

Permanent Paralleling of Lines Prevented

BY C. F. BENHAM
Assistant to General Superintendent, Great Western Power Company, San Francisco, Cal.

LARGE industrial loads frequently necessitate a duplicate high-voltage service, and whenever possible it is handled through a double throw switch to avoid paralleling the two supply lines. Occasionally it is not desirable to the consumer to have an interruption occur for the short duration of the throw-over, especially where the process of manufacture is continuous, as in oil refineries, cement plants, powder works, flour mills, etc. Paralleling the two supply lines momentarily is more satisfactory, particularly where the power company requires occasional transfers for its convenience in maintaining lines.

Since it often falls upon employees of the consumer, not directly under control of the power company, to handle this switching, it is an advantage to have an automatic feature when oil breakers are used, a condition that prevents both switches being left in indefinitely, permanently tying two feeders together. In some cases the Great Western Power Company uses the arrangement shown in the accompanying diagram, wherein by means of the 110-volt alternating current power available for tripping, two time delay relays and a slight time delay on the trip coils of the circuit breakers, one breaker trips out upon completion of the closing of the other. In case it is desirable to leave both switches closed, this can be accomplished by opening a control switch on the 110-volt tripping power. By adjusting the time delay on the relays, giving one more time than the other, it is possible, in event of power failure on both lines and the closing of the second switch to get power, to have a predetermined switch open first when power is restored, leaving the load on the preferred line.


110 A.C. from station service
Indicating lamp
Time delay on trip coils
Hand operated oil circuit breaker
Hand operated oil circuit breaker
Time delay relays wound for 110-V., A.C. continuous operation
22-Kv. Transformer bus
a = Contacts closed when oil circuit breaker is closed

SELECTIVE TRIPPING DEVICE FOR OIL CIRCUIT BREAKERS

Double-Cooled Transformers Solve Problem

PROVISION of the desired reserve capacity in transformers sometimes requires an investment that is difficult to justify, because availability of service has such an intangible value. However, one operating company has employed a method of providing reserve capacity that is not so expensive under certain conditions. It involves the use of combined self-cooled water-cooled transformers in three-unit or four-

unit substations. For example, the self-cooled rating of the transformers might be 3,750 kw. and the water-cooled rating 5,625 kw.—approximately 50 per cent more. Normally, the transformers are operated as self-cooled units. If excess capacity is desired, as during a peak load or when one unit is out of service, the cooling water is turned on.

In a substation equipped with four 3,750-kw. (self-cooled rating) transformers, a load of 15,000 kw. can be carried without using cooling water. By turning on the water a peak load of 22,500 kw. can be carried. If one unit is unavailable, it is still possible to carry a load of 16,875 kw, with three units by using water cooling.

Likewise in a substation of three 5,000-kw. (self-cooled rating) transformers, a load of 15,000 kw. can be carried without water, an equal load with two units operated with water or a peak load of 22,500 kw. with three units operated with water.

Obviously, the cost of circulating water, piping and protection against freezing must be balanced against the price of providing reserve capacity in other ways.

An Easily Constructed High-Voltage Portable Test Set

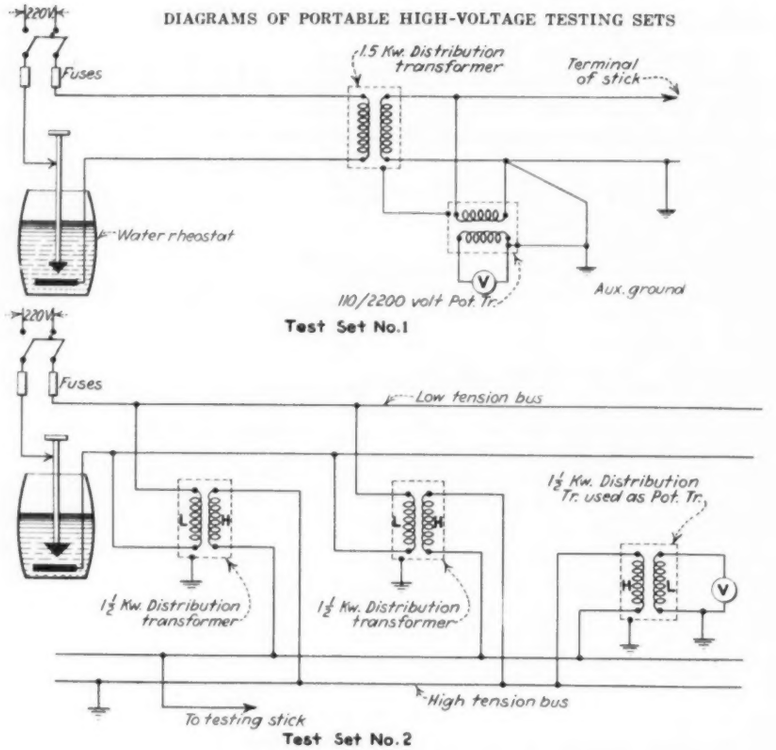
BY H. M. FRIEND
Formerly of Hugh L. Cooper & Company

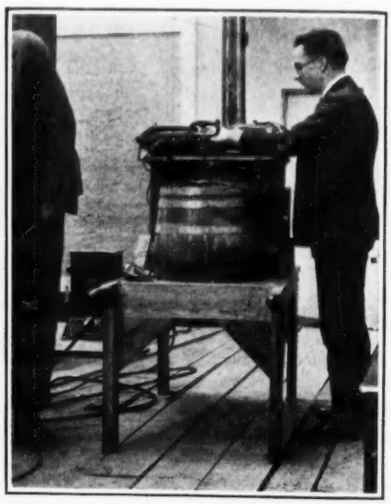
THERE are many occasions on electrical construction jobs where a portable high-voltage testing set would be very useful. There may be a large permanent testing set for the station, but it may not be possible or convenient during various stages of the construction work to use it at many points on the job. For instance, in testing control cable and station auxiliary service cables between conductors and to ground, the ends of the cable may not be accessible to the large station testing transformer during the construction period or this transformer may be in use on other tests.

The following description applies to portable high-voltage sets that were used for testing out all the control and station service auxiliary cables in the hydro-electric power house at Muscle Shoals, Ala., and were found very practical and useful. The parts to make up these sets are available on most construction jobs.

One set consists of a distribution transformer (in this case 1.5 kw., 110/2,200 volts), a potential transformer (2,200/110 volts), a voltmeter (0-300 volts, 0-150 volts), a wooden barrel used for a water rheostat and a wooden test table mounted on wheels. The diagram of connections is shown in the upper part of the drawing. It will be noted that the frame of the distribution transformer and the potential transformer are grounded to prevent injury to the operator in case failure of windings to frame should occur. Either low-tension terminal of the potential transformer is grounded to prevent any possibility of high voltage getting on this winding. Long leads are brought out from the high-tension terminals of the distribution transformer; one of these has a clip on its end to connect to ground or one side of the circuit under test, the other is connected to the end of the test stick, which is carried by one of the operators. On this set an auxiliary ground connected to a water pipe is used for additional safety.

DIAGRAMS OF PORTABLE HIGH-VOLTAGE TESTING SETS





A SET IN USE

To operate the set the wooden keg was filled with water to which a handful of salt was added. The fuses were inserted in the circuit, the switch closed and one operator adjusted the voltage by means of the handle on the water rheostat while the other operator held the terminal of the test stick clear from ground.

When a test failure occurred, the needle of the voltmeter dropped to zero. The resistance in the water rheostat was sufficient to prevent the fuses from blowing unless the plates were all the way down and in contact with each other, in which case the fuses would blow.

The second test set shown in the diagram, though similar to the one just described, had two distribution transformers connected in parallel to give more capacity for testing, as needed in the case of a long cable. It will be noted that one distribution transformer was used as a potential transformer. The high and low-tension buses shown were mounted on the same truck.

The upper limit of these transformers is 2,200 volts when 110 volts is used on the primary, but there are many cases where a higher

voltage is needed. By using 220 volts across the primary the voltage can be doubled, 4,400 volts. If the transformer insulation will stand this, there is no objection to its use. In fact, on this job 3,250 volts was the regular voltage required from this set and the transformer had to be used overstressed. During the construction work on this job these portable test sets were found very convenient and extremely useful.

Eliminating Vibration in Ground Cables

BY G. H. STOCKBRIDGE
Superintendent of Transmission Southern California Edison Company, Los Angeles, Cal.

CONSIDERABLE difficulty has been experienced by the Southern California Edison Company due to breaking of the ground cable on steel tower transmission lines as a result of crystallization from vibration. The ground wire is of ½-in. seven-strand galvanized steel cable and a typical break shows four strands snapped squarely off and the remaining three drawn out to points. All breaks have occurred just inside the clamp holding the cable to the tower, but due to the location of the cable on the tower midway between conductors no service interruptions have occurred.

An inspection of the line made by removing the clamp shows that the trouble is not confined to any one locality, but single broken strands are found in all exposed sections. Aside from these broken strands the cable shows little deterioration after eleven years of service.

FIG. 1—CONDUCTOR VIBRATION DAMPER INSTALLED ON THE BIG CREEK LINES OF THE SOUTHERN CALIFORNIA EDISON COMPANY

In view of the success the company has had in stopping vibration in the line conductors with a simple and inexpensive damper, consisting essentially of weights attached to the conductor by a resilient connection, it was decided to apply the same principle to the ground cable. The damper as finally adopted for use on the conductors is a modification of the damper described in ELECTRICAL WORLD for Dec. 26, 1925, page 1305, and is effective over the full range of observed vibrations and produces more uniform results than the original type. This improved damper is shown in Fig. 1.

It was found that the vibration in the ground cable, as well as that in the conductors, is in a vertical plane, the waves themselves being from 5 ft. to 10 ft. between nodes and with amplitudes as great as ¾ in. The length of the waves indicated that the damper to be most effective should be 2½ ft. from the tower clamp. It was found that a weight of 5 lb. at each end of the span would be sufficient. Instead of using two 2½-lb. weights and a correspondingly lighter cable connection as in the case of the conductors, a single 5-lb. weight with a ⅝-in. galvanized cable connection was found entirely satisfactory. This is one-half of a conductor damper with a pressed-steel galvanized clamp in place of the aluminum clamp that was used on the conductor. This modified damper and its location on the ground cable is shown in Fig. 2.

These dampers are being installed by the patrolmen with the line itself energized, and are depended on to stop any further breaking of strands in the ground wire on account of vibration.

Suggestions on Electric Welding

METAL arc welding has been found particularly suitable for the construction of ship hulls and machinery foundations, according to J. W. Owens, director of welding Newport News Shipbuilding & Dry Dock Company, addressing the annual meeting of the American Welding Society recently, because of its extreme flexibility and the ability to localize the thermal energy. Electric resistance welding, although used extensively in the manufacture of metal furniture for ships and for

FIG. 2—TYPE OF VIBRATION DAMPER FOUND SUCCESSFUL IN PREVENTING CRYSTALLIZATION FROM VIBRATION IN OVERHEAD GROUND CABLES

tanks of light-gage metal, has the inherent limitation of restricted portability. Lap and tee joints are easy to assemble and have the lowest residual stresses of the various forms of joints when welded subsequent to complete assembly. Since automatic arc-welding machines make it possible to weld the butt joint at a high rate of speed and thereby reduce thermal stresses to a minimum, it might be possible in the future to use this joint, unstrapped, provided the carbon content of the plate be kept low, preferably below 0.15 per cent, and the joint properly reinforced with weld metal, according to Mr. Owens. Better results might also come from the deposition of a weld metal of a higher tensile strength than the base metal, or of a weld metal that has high ductility, as can be secured with the hydrogen arc.

The width of lap joints, when metal-arc welded, may be reduced to the thickness of the plate. However, assembly is, in general, greatly facilitated by the use of bolts through the faying surfaces. Assembly holes should preferably be punched from the faying side, as the burred plate edge prevents close alignment of plate surfaces. The number of assembly holes should be the minimum required for assembly. Bolts may be temporarily tack welded adjacent to the joint in lieu of punched holes and the joint surfaces pulled together by clips. Magnetic clamping devices may also be developed. On completing the welding, assembly holes should be closed by the insertion of a rivet burr in the hole and welding of one or both sides.

For metal-arc welding the full fillet weld should be considered standard and employed wherever possible. The light weld may be used in securing tightness or in place of mechanical calking in riveted joints, but neither it nor tack welds should be considered in the determination of the strength of the joint. Reinforced fillets should be employed wherever it is possible to use only one fillet to secure maximum strength or tightness. In general, welds should be made continuous.

All metal-arc welds should in general be made in one layer. However, the use of multiple layers is frequently necessary due to the thickness of the metal weld, the weight of the weld and the tightness required. If gas or oil tightness is necessary, a continuous fillet weld should be made on each edge of the lap of both sides of the tee joint. When only one fillet edge is possible and oil or gas tightness is required, the weld should be made in at least two layers.

Ship plate, which has in general a carbon content of 0.25 per cent, can be welded satisfactorily. However, a reduction in the carbon content to 0.15 per cent would be preferable. Welding is generally satisfactory in ship construction for joining medium, soft or flange and common steels, wrought iron and castings and forgings of ferrous metals. According to Mr. Owens, welding for strength purposes should not be used on armor plate, special-treatment nor high-tensile steel, due to the embrittling effect of the fusion heat on the material.

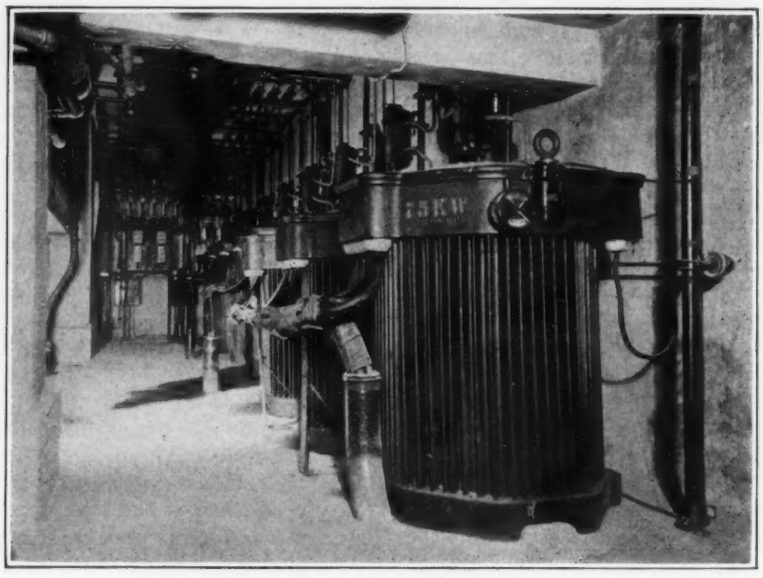
CURRENT VALUES AND SIZES OF BARE ELECTRODES RECOMMENDED FOR VARIOUS THICKNESSES OF BASE METAL WELDING

Thickness of Base Metal (Inches)	Size Electrode (Inches)	Amperes
1/16	5/32	80-125
	1/8	125-160
1/8	1/8	125-160
	5/32	160-180
3/16	3/16	180-200
1/4	3/16	200-225
5/16	3/16	180-225
	1/4	200-260
3/8	3/16	180-225
	1/4	200-260
7/16	3/16	180-225
	1/4	200-260
1/2	3/16	180-225
	1/4	200-260
1	3/16	180-225
	1/4	200-260

Transformer Vault for a Modern Theater

BY S. C. HENTON
Northern Ohio Power & Light Company

THE new Keith Theater at Akron, Ohio, employs the most modern electrical devices for illumination, ventilation, color effects and control. The normal primary supply is at 4,000 volts, three phase, four wire, through 250,000-circ.mil cable direct from High Street substation. A similar cable gives an emergency supply from another primary circuit, which can be fed from either the High Street substation or the Water Street substation. All of these cables terminate in oil switches, which are electrically interlocked and either manually controlled from outside the transformer room or remotely controlled from the main switchboard. The transformers, nine in number, are provided with thermotel devices to indicate the amount of load and heating, the load being divided among the three phases and lighting balanced on the two sides of the 115/230-volt secondaries in such manner that the load can be readily transferred in case trouble develops on any transformer unit.



A TRANSFORMER VAULT SERVING A MODERN THEATER

Primary cutouts are of porcelain and all apparatus is of fire-resisting construction. Drain to sewer, water-pipe grounds, lighting on door switch and forced ventilation are provided. For the main lighting the flexibility of this supply system gives 24 chances for rapid restoration of service in case of failure of any part.

Commercial Activities and Public Relations

Determining Meter Size for Industrial Loads

FOR alternating-current service demands in excess of 75 amp. the Public Service Company of Northern Illinois installs 5-amp. meters with different size current transformers. Below this demand the rating of the meter is adjusted thereto. However, no quick rule-of-thumb method has been found that is applicable to determine the size of meter or current transformer, the meter department relying for the necessary data chiefly on the power sales engineer who closes the contract.

Naturally the present maximum demand is one determining factor, but it is equally important to know what magnitude the demand may attain in the near future so it can be determined whether it will be less expensive to install a larger meter or current transformer than is immediately needed or to substitute one later.

	Per Cent
For installations less than 10 hp. (only one motor)	85
For installations less than 10 hp. (more than one motor)	75
For installations of 10 to 50 hp. both inclusive irrespective of number of motors	65
For installation greater than 50 hp. irrespective of number of motors	55

If electric drive has been used before the purchased-power contract is closed, the maximum demand can be checked or measured by temporarily installing a demand meter. If such is not the case, certain data and clauses included in the contract supplemented by the power salesman's report on the installation afford means of roughly estimating the demand and ascertaining its possible rate of increase.

For example, one contract clause is to the effect that "The customer's apparatus consists of ———, having a total rated capacity of —— hp." Furthermore, that "The company shall not be required to furnish service for a connected load in excess of —— hp. (rated capacity)" and that "The customer agrees to make written application to the company for any service in excess of the number of horespower here specified."

In one form of contract it is stated that "The maximum demand per month will be deemed a certain proportion of the kilowatt equivalent of the rated horsepower capacity of all motors or other apparatus connected in accordance with the accompanying table."

Of course this table gives only an approximate method of determining maximum demand from connected load, because the ratio is very unstable even in the same industry due to operation, overmotoring and diversity factor. However, experience has shown that the diversity factor is much larger on large loads composed of small motors than on small load of large motors even in the same industry.

When the meter is installed, the connected load is checked and reported, as is also done every time the meter is checked. For large loads, meter checking is done more frequently than the law requires so the utility can adjust discrepancies before they become of such magnitude that the company is losing considerable revenue.

After the service is in operation, the maximum demand, which is reported monthly by the meter reader with kilowatt-hour consumption, is checked against the estimated prospects of load increase and size of meter or current transformer, as well as other limiting factors such as cable or transformer rating, voltage drop, etc. From these data the power sales department is able to maintain a record of each large customer for future reference and comparison purposes, indicating the customer's name, type of contract, monthly maximum demand, energy consumption and bills with dates.

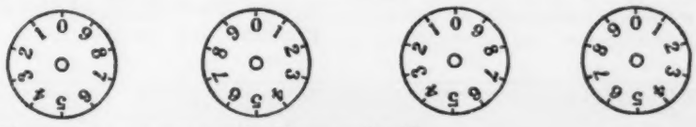
Return Post Card Lessens Meter-Reading Pickups

METER-READING pickups or back calls at houses where no one was at home when the meter reader made his regular visit tend to slow up the whole system of making out customers' bills and also increase the cost of meter reading. To minimize the necessity for the meter reader going back repeatedly to get the reading, in such cases many central-station companies use a form of return post card upon which the customer can mark the position of the hands on the meter dials and mail the card in to the company. The ELECTRICAL WORLD has received a number of requests from companies asking either for samples of such post cards or for the names of companies that use them.

Route.....Account.....Reader.....

Our Meter Reader has called to read your meter but has found no one at home. May we ask you to kindly mark the following dials as indicated by your meter. Return card before.....

This Date .....



Please sign your name and address and mail.

THE PENNA.-OHIO POWER & LIGHT CO.

.....
(Name)

.....
(Street and Number)

RETURN POST CARD FOR CUSTOMER'S USE IN FURNISHING METER READING

A typical post card of this kind used by the Pennsylvania-Ohio Power & Light Company, Youngstown, Ohio, is shown in the accompanying illustration. When the meter reader calls at a customer's house and finds no one at home, he fills in one of the cards in the blank spaces for the meter route, account number, meter reader's initial and

date. The card is left in a conspicuous place either at the door or in the mail box and it has been found that between 80 and 90 per cent of these cards are returned within two or three days with the positions of the dial hands properly marked. The cards of course carry the company's return address on the other side.

Aids to Range-Load Development

WHERE quick but healthy electric range development is wanted, D. L. Cash, commercial manager Rockford Electric Company, Rockford, Ill., considers the following requirements essential:

A sliding-scale residential rate to encourage installation of the major appliances, with a one-meter installation to cut investment and installation costs. Experience in Rockford has shown that it encourages the free use of major household appliances and pyramids the revenue.

A low-priced leader to install complete at about $100 to $125. The Rockford company uses a three-burner cabinet model stripped of controls and plans just to "break even" on it, but thereby spreads the electric-cooking idea to the maximum number of homes. On the larger models a nominal merchandise profit is taken.

Low installation cost. Installations are contracted to local firms at a flat figure of $35 for conduit jobs using a safety entrance switch. Of this figure, 48 per cent is material and 52 per cent is labor. The actual cost now averages $32, but by watching the purchasing of materials and with close co-operation with the contractors it is hoped to reduce the actual cost to $25.

Deferred payments. Of the total selling price of the range installed 25 per cent is received as cash with the order or on delivery of the range, the remainder being spread over twelve to sixteen months. Of the range business 80 per cent is on the deferred payment basis. The utility carries the account, placing range payments on its monthly meter bills. All orders are subject to strict credit investigation before delivery. Out of 400 sales only three ranges were repossessed for delinquency.

Range manuals. Photographs of local kitchens showing housewives at the ranges, testimonial letters, reproduction of ledger accounts showing costs, etc., are employed. A sales easel that can be set before the prospect to illustrate sales points is employed.

Keeping electric ranges before the women of the community. This is done through cooking schools, exhibits, demonstrations, clubs, church suppers, etc. At Rockford several ranges are reserved for lending to lodges, bazaars and club suppers. Special sales effort is expended in getting ranges into the homes of architects, builders, city officials and leading citizens as a nucleus upon which to build more business.

Prompt service on range complaints. At Rockford service calls average only one every two years per range, but when they do come "fire-department" service is given. Service calls are kept down to a minimum by observing three rules: Selling only quality ranges, teaching the housewife how to use them and provision of variable voltage burner units to handle 110 to 120 volts.

The average consumption per range at Rockford is 1,680 kw.-hr. per year, or $50.40 per year when figured on the third or 3-cent step of the sliding-scale rate. Five years ago the company was afraid of the range load, fearing the demand on transformers. According to Mr. Cash, however, the company has never noticed the increase in range load from the service point of view so easily has it been absorbed in the normal development of the distribution lines.

Electric Hen Hatches 3,000,000 Chicks Yearly

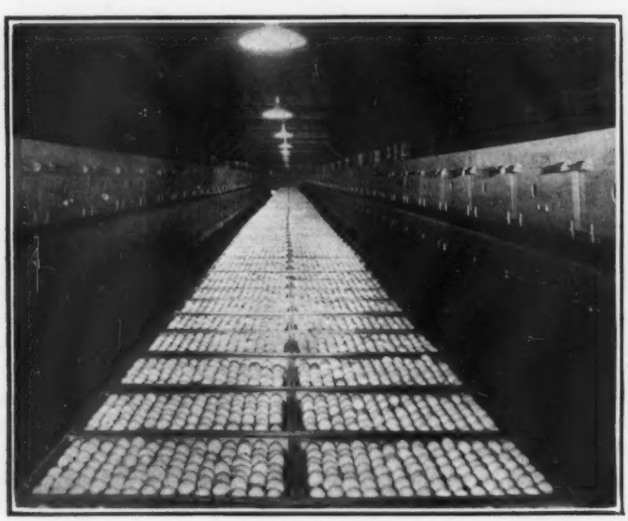
BY H. H. DUNN
Berkeley, Cal.

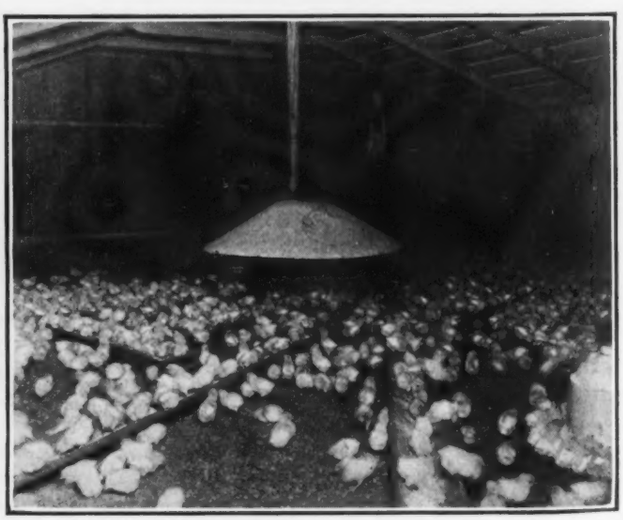
ELECTRIC energy is hatching chicks at the rate of 3,000,000 a year in an electrically operated incubator of the Must Hatch Incubator Company at Petaluma, Cal.

Electricity maintains the heat at 103 deg., turns the eggs six times every 24 hours, shows a signal if anything goes wrong in any one of the compartments, starts illumination of the entire plant promptly at 6 o'clock each evening, cutting it off the following morning; drops the door to each compartment at the end of the twenty-first day, so that the hatched chicks may have light and air; and then turns on the heat in the huge brooders, to which a force of men transfer the 560,000 chicks of each setting.

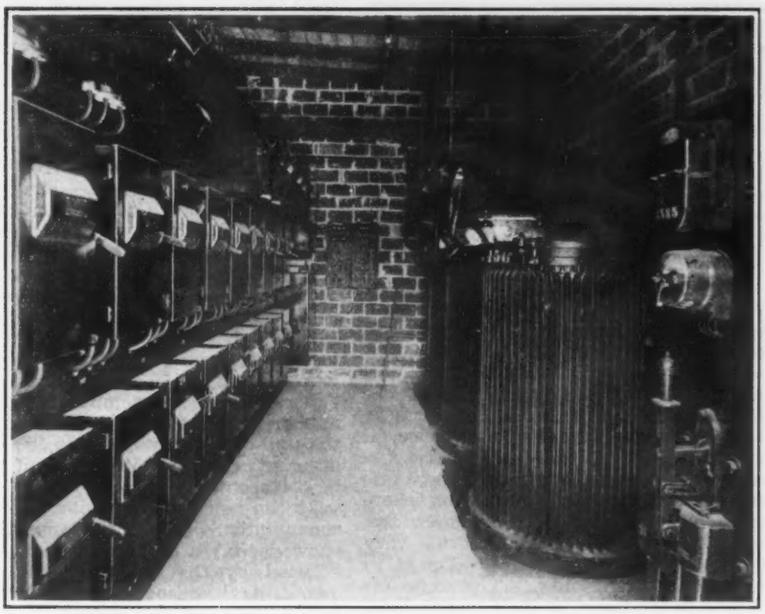
Power is supplied through the customer's own substation, shown in the accompanying illustration. Distribution to the incubators is made through an automatic switchboard, the maximum demand being 620 kw.

Upon reaching the incubator, the eggs are passed, one at a time, before an electric testing lamp. Unfertile eggs are eliminated by this "egg X-ray," and are sold to bakers or other large consumers. Then the fertile eggs are placed on trays on a long table passing down the center of the double row of incubating compartments. Here the eggs are again inspected by another group of testers, equipped with specially designed electric lights, and the trays finally pass into the compartments.





AT LEFT, PART OF A SETTING OF 500,000 EGGS TO BE HATCHED IN 1,260 ELECTRICALLY HEATED AND CONTROLLED COMPARTMENTS. AT RIGHT, ELECTRICALLY HEATED BROODER



TRANSFORMER AND AUTOMATIC CONTROL ROOM FOR ELECTRIC INCUBATOR

In these compartments the correct amount of oxygen, the exact quantity of moisture and the proper degree of heat for best results in incubation are maintained by thermostats.

The one setting of eggs weighs 30 tons, and each egg is turned automatically six times every 24 hours. In the Must Hatch incubator these eggs are so turned at the rate of 100,000 every ten minutes, and the total turning of one setting requires about one hour.

When the birds come from the incubator compartments they are passed immediately to large brooder rooms, prewarmed automatically by electricity and where the heat is held uniform by thermostats.

State poultry authorities and poultry raisers' associations have found as the result of their experience that the electrically operated incubators produce more uniform incubation and better and stronger chicks than with other kinds of heat.

Farmer Service Is Increasing

RURAL extensions to nineteen farms figured quite prominently in the outside construction work of the Southern Wisconsin Electric Company, Lake Geneva, Wis., during two recent spring months. Approximately seven miles of such line was completed. One extension of three and a half miles furnishes service to eight farms. Another eight-pole extension serves four farms. A rural settlement, in which seven residences, two stores and three large dairy farms are served, was connected by another extension. Four other farms were connected for light and power. H. W. Beckwith is commercial manager of the company.

Utilities Seek Public Viewpoint on Radio Interference

AN OUTSTANDING feature of the Middle West Division convention of the N.E.L.A. at Des Moines, Iowa, recently, was a session to which were invited representatives of the public in Indiana and Iowa so that they might present their attitude on radio interference and means of co-operating with broadcast listeners. The speakers were H. A. Luckey, president of the Radio Listeners' League, Indianapolis, and Francis St. Austell, vice-president of the Iowa Radio Listeners' League, Des Moines. In addition, Prof. J. K. McNeely, Iowa State College, Ames, Iowa, was given the opportunity to discuss some causes of interference and R. O. Smith, Radio Corporation of America, was given a similar opportunity. W. H. R. Baker, General Electric Company, went into considerable detail diagnosing possible causes of trouble, suggesting remedies and explaining how causes of trouble can be located.

Education of broadcast listeners to the co-operative solution of their problems is the only answer to reduction or elimination of radio interference, declared Mr. Luckey. When the public pays from $200 to $300 for a radio set, it expects perfect reception but seldom gets it, due to interference. As a result, the set is not used extensively and the utilities are affected chiefly by the influence on domestic consumption due to charging batteries and lighting.

Mr. Luckey admitted that the public usually blames the utility for all interference, but the Radio Listeners' League of Indianapolis was conservative enough to investigate before blaming. This investigation showed that only one out of ten interferences was due to utilities. Sixty-five per cent of radio interference is due to radiating receivers, maintained Mr. Luckey. This fact should be called to the attention of the press and radio periodicals, as well as means of overcoming it. The league secured the co-operation of the local utilities and all complaints submitted thereto were turned over to the league for checking. As a result the complaints dropped from 500 to 50.

About the same time educational campaigns were started on the causes of interference. So much interest developed that conversion of the league into a national organization was considered. At this point Mr. Luckey explained the danger of utilities endeavoring to educate the public directly, pointing out that broadcast listeners' associations can handle the problem on a co-operative basis. Furthermore, utilities cannot always remove interferences caused by customers' apparatus, but the league can be more successful.

For fear that local broadcast listeners' clubs should go off on a tangent, they should be guided by persons who have studied the problem. This the national organization is ready to do. It has prepared a form of organization and procedure and a book on what listeners can do to avoid interference. The utilities' main job is to aid and co-operate with the local leagues. The United States Radio Conference has not been representative of broadcast listeners in the past, but the Radio Listeners' League of Indianapolis is hopeful of developing this representation.

Mr. St. Austell declared that he had found the utilities sympathetic, co-operative and ready to help in education. He expressed the belief that when a utility has been causing radio interference and has corrected the trouble, it should tell the public what it has done, as the public will appreciate it.

Digest of Electrical Literature

Hydro-Electric Development and Steam Equipment

Hydro-Electric Development in Quebec.—CLARENCE E. CHRISTIE.—The second of a series of articles dealing with power developments throughout the British Empire. The physical characteristics of the province of Quebec and its main water-power resources, both developed and undeveloped, are discussed with the aid of an accompanying map. The water-power resources are separated into the following groups: those on the Ottawa River and its tributaries, those on the St. Lawrence River, those on the St. Maurice River, those on the Saguenay River and its tributaries, and those on the south side of the St. Lawrence River, particularly on the St. Francis River and its tributaries. It is estimated that there is a total of 12,000,000 hp. available for development in the province, about one-half of which is within reasonable transmission distance (under 150 miles) of present industrial centers. Of this amount about 1,500,000 hp. has already been developed. It is stated that the load factor of the hydro-electric stations supplying the various industrial establishments and providing power and lighting service to the community would be from 55 to 65 per cent, and there is a discussion of the necessity of large storage reservoirs at the headwaters of the rivers in order that the full flow of water may be utilized. Considerable space is given to the utilization of power in the pulp and paper industry, since this is one of the largest industries in Quebec. The use of secondary power at a rate of approximately 0.12 cents per kilowatt-hour for electric and steam generators in preference to boilers using coal at $6 per ton is also considered.—*World Power*, May, 1926.

Transmission, Substations and Distribution

Reliability of Long-Distance Power Supply.—A. PEUCKER.—A contract for the supply of electrical energy, like any other commercial contract, is based primarily on the reliability of delivery. The author maintains that three distinct classes of faults in the delivery must be distinguished—short interruptions, long interruptions and inability to use available power. This is explained by operating experiences of the Berlin municipal supply, which is today covered up to three-fourths of its demand by power arriving at 100 kv. from far-away superpower stations. Stations within Berlin cover merely peak loads. It is interesting to note that by far the greater number of the major power interruptions on this system were due to faults in the local peak plants. Only about 0.03 per cent of the loss was due to faults in the 100-kv. lines. Many local interruptions could have been materially shortened if the rotaries used had been less sensitive to voltage fluctuations, such as, for example, American types. It is also of interest to note that of 37 faults during 1924 only eight were due to lightning troubles. Since power stations co-operate with meteorological observatories, storm warnings are quickly issued and broadcast. — *Elektrotechnische Zeitschrift*, March 11, 1926.

High-Voltage Tie Line.—I. PLANNER.—One coal mine and two steel mills operated by a large Austrian steel concern in Styria were dependent for their supply of electric power upon their own relatively small generating plants. To insure greater reliability and to forestall local interruption of service, it was decided to provide a 35-kv. tie line connecting the three establishments to one power system. Although the transmission line is but 21 miles long and may transmit only 9,000 kva., very unusual means had to be adopted to insure full reliability. The right-of-way is in the heart of the Styrian Alps, where the winter climate is exceedingly severe, where high altitudes have to be crossed and where statistics show annual avalanches of snow. In addition to these handicaps, it was found that near the coal-mine end of the line, owing to earth movements, towers could not be counted upon to remain permanently in the spot where they were originally erected. It was therefore found necessary to refrain from the usual anchoring of the towers into the ground and to make their basis very heavy (50 tons) and let them rest unfastened upon a sliding surface. The copper cables are insulated from but not rigidly fastened to these towers. A special feature of the line is a power-factor shifter, which automatically maintains unity power factor. Carrier-current telephone communication is maintained over the 35-kv. line between the three establishments.—*Siemens Zeitschrift*, March, 1926.

High-Voltage Problems and Y-Grounding.—A. RACHEL.—In his introductory remarks the author investigates how far the technical and economical expectations from the highest-voltage transmission systems have been fulfilled, and he comes to the conclusion that, in general, satisfaction in both respects has been obtained in Germany. Although non-existent as yet, a further development beyond 100 kv. is certainly to be hoped for. Short mention is made of American 200-kva. plants and systems. Systematic safety rules would be essential for the introduction of this voltage in Germany and Europe in general. Such proposals have been made by both the Siemens concern and the A.E.G. The paper analyzes further technical and economical advantages of Y-point grounding. For a few concrete examples cost curves are given and the problems of power-factor correction are elaborated. The author distinguishes, in particular, between "energy transmission" and long-distance transmission," and goes into considerable detail on the characteristics of these two typical cases. The final result is that, to be technically and economically succesful, transmission systems for more than 100 kv. require solid grounding of the Y-neutral. — *Elektrotechnische Zeitschrift*, March 11 and 18, 1926.

Generation, Control, Switching and Protection

Three Illinois Mines Generate Their Own Power.—E. STECK.—The Indiana and Illinois Coal Corporation operates a mine at Nokomis, having a capacity of 6,000 tons, and two at Witt, one with a capacity of 3,500 tons and the other with a capacity of 2,500 tons per day. These mines are known as Nos. 10, 14 and 12 respectively. The boiler plants are typical old-style mine plants, using mostly 150-hp. return tubular boilers, with no attempt at consistent engineering layout for boilers. In 1923 the coal company used 1,655,400 kw.-hr. at a net cost of $56,000, or a charge of 3.43 cents per kilowatt-hour. That year the run was irregular and power consumption low. An investigation showed that a large saving would be effected by the company building its own central station and abandoning its boiler plants at mines Nos. 12 and 14. Three water-tube boilers having normal capacity of 353 hp. and maximum capacity of 700 hp. each have been installed, each having two drums 36 in. in diameter and 24 ft. 9 in. long and 175 straight tubes of 4-in. diameter and 18 ft. long. Steam is generated at 175 lb. and delivered to the header with 100 deg. of superheat. The prime movers consist of two 1,800-kva., three-phase, 60-cycle, 2,400-volt generators driven by direct-connected condensing steam turbines. A 35-kw. turbine-driven exciter is furnished to supply excitation to the two turbo-generators and to supply power for the station at night in case of emergency. Additional space is provided in the turbine room for a smaller unit to be installed later to take care of the night and idle-day loads. A pond near the power house is used both for boiler-feed water and for operating the condensers. Water from the pond is taken by gravity through a concrete basing with removable screen and settling chamber to cold wells in the condenser room, whence the condensers lift it by short suction lines. A bank of three 75-kva., 2,300/400-volt transformers is used to supply power to the motors in use at the power plant such as those for condenser drive, compressors, pumps, conveyors, etc. Mine No. 14, which is less than a mile away, is operated by a 2,300-volt transmission line, and No. 10 which is about 9 miles distant, by a 23,000-volt line. For operating mine No. 10 there are two transformer substations, delta-star-connected, each consisting of three 667-kva. transformers, one at the generating end and the other at the receiving end. Making no allowance for savings in maintenance, coal and labor in these old plants, the new power station will show a reduction in the power costs of from $20,000 to $50,000 per year over purchased power, depending on the running time of the mines. This saving is greatly increased by shutting down the old steam plants, so that this new power plant will pay for itself in from three to six years. After the plant has paid for itself, the cost of producing power will of course

be much further decreased.—*Coal Age*, June 10, 1926.

Motors and Control

Boucherot Motors. — H. LUND. — A considerable amount of effort has been expended in attempts to satisfy the commercial demand for a squirrel-cage motor with a low starting current and high starting torque. From the constructional point of view the best solution has been provided by the current-limiting motor. But its better starting properties are accompanied by less satisfactory operating features. It is possible with a Boucherot motor, which has a starting torque of approximately twice that of its working torque and a starting torque of at least 75 per cent of its normal torque, to obtain operating results not noticeably inferior to those of an ordinary slip-ring motor. A star-mesh connection is used, and there is the further disadvantage that the material in the current-limiting motor is rather less utilized than in the standard motor, because it must be worked at a lower magnetic saturation. These conditions are, however, quite suitable in many cases, as is obvious from the relatively frequent employment of the current-limiting motor in foreign countries where the regulations of the public supply authorities are less stringent. In addition to the Boucherot motor with two squirrel cages, there are several other types of motor in which the starting current is limited; of these, the "high-bar" motor and the motor with two crossed bars in each rotor slot have attained a certain amount of practical importance. The characteristics of these three types of motors are compared in the article, and the conclusions drawn are that the Boucherot motor will furnish the most satisfactory solution. — *A.E.G. Progress*, May, 1926.

Ward-Leonard System in the Steel Industry.—E. RIECKE.—Forging presses with maximum pressures of 400 tons and upward are operated hydraulically, and two systems to obtain the necessary hydraulic pressure have been developed in practice. In the so-called straight hydraulic system the hydraulic pressure is generated by pumps designed for the average hydraulic requirements. A weighted accumulator serves as an equalizer and to maintain the pressure. When the accumulator reaches its highest position the hydraulic pump is either caused to run light or shut down completely. In the latter case the pump is restarted at the proper time by an automatic starting device. The energy stored hydraulically is therefore only seldom fully utilized. In the steam-hydraulic system the hydraulic pressure is generated by equipment which only operates when required, namely, when the ingot is passing through the presses or when the shears are actually cutting. This pressure is supplied directly to the hydraulically operated machine. The inefficiency in operation of steam hydraulic equipment, to which attention has been drawn, induced manufacturers to examine this question carefully with a view to overcoming the difficulty by the development of a suitable type of electric drive. The electro-hydraulic equipment, developed to satisfy the conditions necessary for operation, is built on similar lines to the steam hydraulic equipment. A comparison of the energy consumption of specific steam and electric equipment brought forth the information that the power used amounted to 5 kw.-hr. and the constant load on the network was 150 kw. A motor with a continuous rating of 140 kw. was therefore required to drive the Ilgner converter, the energy demand being completely equalized by using a flywheel weighing 7,000 kg. To accomplish the same work steam hydraulic equipment required steam, reduced to electrical units, amounting to 39.12 kw.-hr. This value is calculated on the assumption that the steam loss consumption is 200 per cent of the useful steam consumption. Two reversing drives which have recently been installed in the Rhineland on a roughing and a finishing mill are specially interesting.—*A.E.G. Progress*, May, 1926.

Units, Measurements and Instruments

Elliptic Locus Method for Predetermination for a Salient-Pole Synchronous Generator. — KUMEO BABA. — The principal feature of this paper is largely based on experimental data indicating that the mmf. vector of the loaded armature reaction of a salient-pole synchronous generator describes an elliptic arc when the power factor is varied, keeping the load constant. The chief difficulty in the determination of the regulation of a large built-up synchronous-generator lies in securing an ideal load of specified power factor and its driving source. The A.I.E.E. recommends the direct actual measurement of the regulation first of all and gives several methods for use when the actual loading is not possible. The writer classifies these methods and demonstrates their characteristic errors with the purpose of developing an elliptic locus method of his own devising. This latter method is quite the same as the circular-current diagram method with regard to the vector phase relation. The merit of the purposed elliptic locus method is that it combines the superior experimental accuracy of the constant mmf. method at a high-power-factor load and the theoretical vector angular relation of the Tordu-Heymann method.—*Journal of Institute of Electrical Engineers of Japan.*

Heat Applications and Material Handling

Electric Welding the New Stainless Steels.—C. J. HOLSLAG.—Electric resistance welding of all the new non-corroding or stainless iron and steels for special containers, piping and tanks, etc., is entirely possible. At least such welding has proved very simple with all the different "trade-name" metals that have come to public notice to date, such as "Everdur," "Duraloy," "Askaloy," etc., as well as with various combinations of chromium with iron and steel not specifically named. Another very useful method is arc welding. The stainless steels and irons can be welded by the metallic-arc process and likewise by the carbon-arc process where warping can be taken care of. In welding by the electric arc welding-wire process the surface of the steel adjacent to the weld is of a necessity raised to a high temperature for a sufficiently long time to have a serious physical effect upon the metal. Consequently the only way in which stainless iron and stainless steel may be successfully welded by this method is to use an alloy that is incapable of being hardened no matter what temperature it may be raised to, and, secondly, an alloy that has some properties retarding speedy enlargement of grain size. It is suggested that the use of silicon in rustless iron will impart such properties to the alloy. The alternating-current arc is best for this welding, but direct current can be used, in which case the work should be made negative and the electrode positive. In either case the higher the voltage that the machine will give up to a maximum of 100, the better will be the weld. The use of high voltage is essential for two reasons—the work can be more steadily controlled by a strong arc, and alloy steels, particularly those of the stainless variety, have a high electrical resistance. For ordinary iron and all steels and "monel metal" results are about the same with direct or alternating current. For bronzes, especially those with high zinc content, brasses and very thin sheet metal, direct current is best, polarity reversed. For stainless steels, nickel and chromium alloys, semi-arc process for cast iron and nickel spotting, lead burning and cutting the alternating-current arc is best.—*Journal of American Welding Society*, May, 1926.

Traction

Diesel-Electric Locomotive.—N. W. STORER.—The Diesel-electric locomotive is very similar in its characteristics, performance and equipment to the motor-generator type of alternating-current locomotive. The main difference lies in the fact that the output of the Diesel engine is limited to a very definite value which can be carried for long periods, while the synchronous motor can carry very heavy overloads for short periods. The complications of the Diesel engine and its auxiliaries necessitate a simplified electrical control. Some of the auxiliaries mentioned are pumps for water circulation and lubrication, air filters and radiators, with a ventilating system for cooling the engine; air compressors for brakes, preferably electrically driven, and means for starting the engine. Weights per horsepower of equipment range from 207 lb. to 400 lb. The largest locomotive of the Diesel-electric type mentioned is one of 1,000 hp., weighing 275 lb. per horsepower. The engine weight is considered to be but a small part of the total weight of the locomotive, the weights of the various auxiliaries pyramiding very rapidly. Although similar to the steam locomotive in the respect that it is limited to the amount of power generated within itself, the absence of dirt and noise and of complicated overhead wiring and the low maintenance charges recommended the Diesel-electric for freight-switching service and for low-speed heavy freight transportation.—*Mechanical Engineering Journal*, June, 1926.

Scientific & Industrial Research

[When investigations which have been completed are, in the opinion of the editors, of wide enough interest to the field we serve, details thereof will be presented in other parts of this paper. Contemplated research or that which appears to have limited appeal will be only briefly reported in this section, but details may be had by communicating with the investigator or institution named in the report. Readers are referred to the department "Digest of Electrical Literature" for investigations reported in other journals. The news and engineering sections should also be followed for research reported before technical societies.]

Research Completed

Circuit Breaker, High-Speed

To obtain the necessary high-speed action, the moving parts are made as simple and light as possible. Powerful springs give the required acceleration to moving parts, and the arc incident to the opening of the circuit is accelerated by means of magnetic blow-out devices. For absorbing the shock of opening, an oil dashpot surrounding the pull rod and a double-acting spring are provided.—*Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.*

Lamp, Gas-Filled Tungsten, Color Temperature of

Certain gas-filled lamps, used as secondary standards of color temperature, were found to require an increase in voltage and current, as they aged, in order to maintain them at 2,848 deg. K. To test for uniformity of behavior, groups of lamps of four different types were put on a life test at voltages that initially brought the lamps in each group to 2,848 deg. K. At intervals the color temperature of the lamps was measured with the rotary dispersion colorimeter at the Bureau of Standards. Three 9-volt headlight lamps, burned at the voltage necessary to bring them initially to 3,000 deg. K, showed drops of 100 deg. during their life of 40 hours. The author concludes that in color temperature measurements frequent checks against primary standards should be made. For rough work only constancy of color temperature at a constant voltage may be assumed.—*Harley E. Howe, Cornell University, Ithaca, N. Y.*

Frequency Recorder

The recorder consists of a frequency bridge in which balance is obtained between a mica condenser in parallel with a manganin resistance and a mica condenser in series with a manganin resistance. With changes in frequency the bridge becomes unbalanced, but may be rebalanced by moving the contacts on two slide wires. The amount of motion of these sliders is a measure of the frequency, and the motion of the sliders carries the recorder pen to the position on the scale corresponding to the circuit frequency.—*Leeds & Northrup Company, Philadelphia.*

Iron, Electrolytic, Recrystallization Temperature of

A study has recently been carried out of the recrystallization temperature of cold-rolled electrolytic iron and open-hearth steel strip. The mechanical properties of the cold-rolled materials after annealing at various temperature intervals up to 700 deg. C. were determined and the microstructural changes studied. The results showed that the electrolytic iron sheet of the composition used was noticeably lower in its recrystallization temperature than the open-hearth steel sheet which was compared with it.—*Bureau of Standards, Washington, D. C.*

Lamps, Comparison of, from National Physical Laboratory

A group of specially constructed standard electric lamps from the National Physical Laboratory, Teddington, England, has been compared with a group of the bureau's primary carbon standards and a group of tungsten substandards. Three complete determinations, against carbon working standards, tungsten substandards and carbon primary standards, were made, seven observers making complete sets of readings. The results are very consistent and a high precision was obtained in the tests. This international comparison is one of the most important tests made in the photometry section for some time.—*Bureau of Standards, Washington, D. C.*

Reflection Factors, Comparison of

Probably the most important work in reflectometry during the past year was an interlaboratory comparison of reflection-factor specimens ranging in value from 4 to 78 per cent. Three laboratories participated in tests of eleven specimens, part of which were somewhat glossy, others fairly matte. In most cases the agreement was excellent and within the range of error which one might easily encounter in measurements in a single laboratory.—*Committee on Photometry of the Optical Society of America.*

Thermometer, Gallium-Quartz

Gallium, when liquid, is similar to mercury in appearance, but is less than half as heavy. It melts at about 86 deg. F., but often may be cooled to more than 8 deg. below zero before becoming solid. It does not boil (give off vapor) under 2,700 deg. F., its boiling point being estimated at between 1,500 and 2,000 deg. C., equivalent to about 2,700 to 3,600 deg. F. Because of certain impurities the liquid metal formerly wetted glass and quartz and therefore was unsuitable for thermometers. It was first made suitable for thermometer use by recent work.—*Sylvester Boyer, General Electric Company, Lynn, Mass.*

In Progress or Purposed

Belting, Rubber, Endurance Tests on

The development of performance tests constitutes the principal activity of our committee on rubber products. A machine for carrying out a life test for belting under flexure has been agreed upon. A number of machines have been ordered by members of the committee and will be used in carrying out correlation tests. It is hoped that the test under consideration may prove a satisfactory one for standardization as a test for rubber belting. This is an important consideration for the railroads, since they use rubber belting in connection with the generation of electricity for lighting purposes on rolling stock, the generator being driven from the axle.—*American Society for Testing Materials, Philadelphia.*

Color, Specification of

Experiments with the Nutting colorimeter have shown that there are serious objections to the employment of this instrument for the measurement of colors other than those of a fairly high saturation. A new method of colorimetry has been devised which depends on the fact that it is possible to match exactly any color whatever by mixing suitable proportions of two monochromatic radiations, one of fixed and the other of variable wave length. An instrument embodying this principle has been manufactured in our workshops and has so far fulfilled all expectations.—*National Physical Laboratory, London, England.*

Galvanometer, Einthoven, Small

Theoretical work undertaken for another purpose pointed to the possibility of designing a very small string galvanometer. Criticism of the theory and comparison of its consequences with experimental data having shown its probable soundness, the instrument was designed and built. It weighs 5.2 kg., which may be compared with 100 kg., the weight of the original instrument, and 18 kg., the weight of the smallest accurate and sensitive string galvanometer hitherto available. The stray field has been much reduced, and the powerful optical system of the larger instruments retained. Strings are mounted in interchangeable carriers. The instrument is portable and at ordinary sensitivities very little affected by mechanical vibration. A sensitivity of 5×10^{-10} amp./cm. has been easily attained and is probably not the limit of its performance.—*Horatio B. Williams, Columbia University, New York.*

Insulating Materials, Molded

The sub-committee on the subject has reported progress in the study of impact tests of molded materials. A machine has been designed and several are being made for the use of committee members in conducting collaborative tests. The sub-committee is making interesting experiments on the form of test piece to be used for tension tests of molded materials.—*American Society for Testing Materials, Philadelphia.*

Noise, Measurements of, in New York City

A systematic survey has been made of the street noise, using the 3-A audiometer devised by the Bell Telephone Laboratories, Inc. A standard buzzer note produced by this instrument is allowed to enter the ear of the observer simultaneously with the street noise. The intensity of the buzzer note is adjusted until it just masks the street noise. Street noise was found to be due practically entirely to traffic, the automobile truck being by far the greatest noise producer, with street cars and the elevated railway making much smaller contributions. The physical intensity of the street noise, estimated by calibrating the ear of the observer, was found to vary between approximately 0.001 and 20 dynes per square centimeter.—*E. E. Free, 175 Fifth Avenue, New York, N. Y.*

Suggestions for Research

Cable, Impregnation of

A test is needed to indicate the minimum impregnation in a section of cable, instead of the average impregnation as determined by the present ionization test. Until such a test has been devised only careful supervision of the impregnating processes will eliminate the variations in quality due to irregular impregnation.—*D. W. Roper and H. Halperin, Chicago.*

Galvanometer Deflection, Amplification of, by Photo-Electric Cell

Dr. Jacob Kunz suggested that the deflection of a moving-mirror system may be amplified linearly by reflecting a beam of light from the mirror to a triangular slit in front of a photo-electric cell. The cell has no time lag and may therefore be used even with short-period instruments, such as the siphon recorder.—*F. E. Null, University of Illinois, Urbana, Ill.*

Oil Sludging

The formation of sludge in oil-immersed transformers has reached such serious proportions on some systems as to affect adversely the operating performance and possibly the life of the insulation. One operating company making an investigation among a small number of other companies came to the conclusion that the amount of sludging in the open type of transformer has greatly increased in recent years and that this increase can generally be attributed to higher operating temperatures, longer and heavier load periods and in some cases to overexcitation. A canvass of the country by an N.E.L.A. sub-committee confirmed this conclusion.—*B. A. Jamieson, Commonwealth Edison Company, Chicago.*

System Stability

Special instruments to obtain desirable system data are being developed, and during the past year wattmeter oscillograph elements and phase-shift indicator equipment have been produced. Operating companies are urged to utilize this class of equipment in order to obtain more data concerning the factors which affect system stability.—*Electrical Apparatus Committee of the N.E.L.A.*

Wave Analysis by Means of a Resonating Circuit

A non-sinusoidal current wave may be analyzed by means of a wavemeter. This secondary oscillating circuit should be coupled to the circuit under test so loosely that there will be no appreciable reaction. The wavemeter is tuned successively to various harmonic frequencies of the main circuit, and the readings are proportional to the magnitudes of respective harmonics (*Elektrotechnische Zeitschrift*, 1923, Vol. 44, page 757). In view of great strides made in oscillating circuits within the last few years, it is thought that this general idea may be worked out into a piece of practical apparatus, suitable for power-plant use. The device may be made to require an operator's setting for each reading, or be continuously indicating or recording the individual harmonics.

News of the Industry

Russians Turn to Cooper

Americans Will Survey Hydro-Electric Project of Soviet, Including Dnieper River Site

A CONTRACT was signed in the offices of the Amtorg Trading Corporation at New York on Monday of this week between Hugh L. Cooper & Company and the representatives of the Russian soviet government now in this country, J. A. Tzishevsky, chairman of the Dnieper Power Commission, and Alexis V. Prigarin, representative of the Supreme Council of National Economy. The object of the Russians in seeking this agreement was to get American advice and direction in building the great hydro-electric system they are planning to set up in the Ukraine.

By the contract Hugh L. Cooper & Company undertake to make a complete survey of the Russian project, which involves construction of a generating station on the Dnieper River with an ultimate capacity of about 600,000 hp., a canal and lock system to open the river for navigation below Ekaterinoslav, a railway connecting the iron ore deposits of Krivoy Rog, the manganese deposits of Nikopol and the Donetz coal basin, and a transmission line to convey electric power to present and potential markets. Representatives of the American company will start for Russia next month. Colonel Cooper will follow them to make a final examination.

It is claimed that with the utilization of the water power of the Dnieper and Southern Boug rivers the exploitation of the rich resources of this region will become considerably less expensive than at present and its development will be greatly accelerated. As an initial step the Dnieper power project includes the construction of new metallurgical plants, ferro-manganese works, aluminum works, and the production of electrolytical steel to be fed by the new hydro-electric construction.

Get 56,000,000 Kw.-Hr. from Muscle Shoals in May

During May the government plant at Muscle Shoals delivered 56,288,100 kw.-hr. to the Alabama Power Company. This made it possible to spare 20,000 kw. for the use of the Southern Power Company, thereby relieving the power shortage in the Carolinas caused by the dry weather. The fact that power from Muscle Shoals was available during the winter made it possible also for the Georgia Railway & Power Company to conserve its storage. Rainfall in the Southeast thus far this year has been 20 per cent below normal.

No place on the formal legislative program has been accorded to the Muscle Shoals bill, but assurances have again been given that time will be found for the discussion of this measure. The offer of the combined power companies for Muscle Shoals was opposed by Representative Almon of Alabama during a conference with President Coolidge. Mr. Almon, who is from the Muscle Shoals district, expressed preference for the offer made by the American Cyanamide Company.

American Capitalists Visit Power Plants in Canada

A party of about eighty bankers and business men, under the management of Aldred & Company, New York, journeyed from that city to Montreal early this week to inspect personally power plants and other properties financed by American money in the Province of Quebec and particularly in the Saguenay district. Members of the party hold either in trust or personally most of the stock and bonds representing investments in that region, and many of them had never before visited the territory they are developing.

Among the men enrolled to make the journey were J. E. Aldred, president of the Shawinigan Water & Power Company; Arthur V. Davis, president of the Aluminum Company of America; C. A. Austin, president of the Seaboard National Bank; A. R. Graustern, president of the International Paper Company; A. A. Tilney, president of the Bankers' Trust Company; Albert H. Wiggin, president of the Chase National Bank; Herbert A. Wagner, president of the Consolidated Gas, Electric Light & Power Company, Baltimore, and H. C. McEldowney, president of the Union Trust Company, Pittsburgh.

Combating Public Ownership Propaganda

Franklin T. Griffith Points Out Before Pacific Northwest Association the Spirit in Which It Should Be Done—Pack, Heed, Aylesworth and Others Speak

TAKING as his text an utterance of the master of the Washington State Grange at a recent meeting that all the water powers of the West are being gobbled up to fill the coffers of the "power trust" with a rain of gold, Franklin T. Griffith, president Portland Electric Power Company, delivered the outstanding address at the annual convention of the Northwest Electric Light and Power Association, which met at Spokane, Wash., June 14 to 17. "In combating the propaganda of political ownership advocates we must give them credit for sincerity in their beliefs and approach them in a rational attitude in our endeavor honestly and fairly to show them the merits of our cause," Mr. Griffith declared.

President-elect R. F. Pack of the National Electric Light Association, of which the Northwest body is a geographic division, also addressed the convention. The keynote of Mr. Pack's remarks was that while the American Public enjoys more of the benefits of electricity than any other nation, if the ultimate advantages of complete electrification are to be carried to the home and industry, the electrical utilities built up by private initiative and genius must be permitted to earn a fair and reasonable return.

In summing up the activities of the year Lewis A. Lewis, president of the association, pointed out that its most important achievement was the contribution of the report of the electric range survey conducted in the Pacific Northwest.

Confronted with the biggest selling job in the nation today, the electrical industry, now only 10 per cent "sold," must elevate its sales managers to executive positions comparable with those of the heads of the engineering, accounting and public relations departments, S. D. Heed, vice-chairman of the Commercial National Section, asserted emphatically as his main message to the convention.

M. H. Aylesworth, managing director of the N.E.L.A., speaking before the Spokane Ad Club, said that the electrical industry in discharging its obligation to the nation had evolved a solution to the Muscle Shoals problem. This was made apparent when the bid of thirteen power companies of the Southeastern States to co-operate in the development and distribution of Muscle Shoals power and to manufacture fertilizer at a lower cost than that proposed by any other bidder was accepted by the joint congressional committee.

Under the rural electrification program now being pursued by the electric utilities of the country there can be no approach to anything resembling peasantry in American rural life, declared Dr. E. A. White, chairman of the National Committee on the Relation of Electricity to Agriculture.

What co-operation has done and can do for the electrical industry in California was shown by C. T. Hutchinson, vice-president and general manager of the McGraw-Hill Company of California and chairman of the California Electrical Bureau. The relation of electricity to American industrial progress and development was described by W. H. Onken, Jr., editor of the ELECTRICAL WORLD.

A prominent place on the program was given to the work of the women's committee. Mrs. Lewis A. McArthur,

chairman of this committee, explained that the Pacific Northwest is the only section of the country to include wives of utility employees in the activities of the women's committee. Isabell Davie of New York headquarters urged that executives encourage the women of the utilities to stimulate the interest of the feminine public in the affairs of the electrical industry.

The convention concluded with a golf tournament and picnic at Hayden Lake. D. C. Green, vice-president and general manager of the Utah Power & Light Company of Salt Lake City, was elected president of the association for the ensuing year. Franklin T. Griffith and John B. Fisken, consulting engineer Washington Water Power Company, were elected to honorary membership.

J. G. White Mexican Irrigation and Power Projects

Although irrigation of vast areas of land is the primary purpose of several dam and water-storage projects which are now being fostered by the Mexican government, large hydro-electric plants will, it is authoritatively announced, be installed wherever their operation is deemed feasible. The magnitude of these enterprises is greater than was indicated in the preliminary plans. It is stated by G. W. Caldwell, general manager of the J. G. White Engineering Corporation of Mexico, which has the contract for the construction of the projects, that they will cost altogether approximately $20,000,000. This is exclusive of a proposed dam and irrigation system on the Mayo River, State of Sonora, which will cost about $10,000,000 and reclaim 250,000 acres of land. The projects which the J. G. White Engineering Corporation have under way are all in northern Mexico and involve the irrigation of 420,000 acres of land, Mr. Caldwell said. The Mexican government, besides making a budget allowance for the work, intends to buy the irrigable land at its market value and sell it to farmers who will live on it and put it in intensive cultivation.

Mr. Caldwell named the projects which the J. G. White Engineering Corporation will construct in various Mexican states as follows: Chihuahua, irrigation of 60,000 acres from a large masonry dam across the Papegochio River; Nuevo Leon, irrigation of 10,000 acres surrounding the Rio Salado by building a 30-meter earth and rock dam; Lower California, irrigation of 25,000 acres of land on the Santa Domingo River, near St. Quentin, by a dam and canals; Aguas Calientes, irrigation of 100,000 acres by construction of a 100-meter arch concrete dam and a large canal system on the San Diego River; Michoacan, irrigation of 40,000 to 50,000 acres by construction of a diversion and storage masonry dam on the Rio Bravo; Durango, irrigation of about 30,000 acres of land from an earthen dam (now completed) and canal system on the Guatemape River, also a project on the Saucedo River involving a masonry dam and canal system for irrigation of 25,000 acres; Tamaulipas, irrigation of about 40,000 acres of land by a small diversion dam and canal system on the Monte River.

Georgia Electrical Men Meet in Columbus

The seventh annual convention of the Georgia Electrical Association was held this week, Tuesday and Wednesday, in the service building of the Columbus Electric & Power Company. More than fifty delegates, representing electrical manufacturers, utilities, contractors and dealers, were in attendance. G. K. Hutchins, president of the association and commercial agent of the Columbus utility, spoke at length on the value of the electrical industry to the country as a whole, outlining some of the most pressing problems. Mr. Hutchins was followed by W. S. Shaw, General Electric Company, Atlanta, who spoke on merchandising a wiring job, making many excellent suggestions. Julian Harris, editor of the *Enquirer-Sun* of Columbus, then outlined the policy of his paper, to which was awarded the Pulitzer gold medal for the most disinterested and meritorious newspaper service in America in 1925.

In the evening session J. O. Smith of the Radio Corporation of America gave a talk on the commercial and merchandising aspects of radio, emphasizing particularly the effects that superpower broadcasting would have on society, industry and commerce.

D. J. Finn of the General Electric Company spoke interestingly on illumination, dwelling particularly on its merchandising aspects, in the final session on Wednesday. J. C. Martin dealt with the "red seal" plan, outlining its advantages and concluding with a demonstration of how to sell the idea to prospective home builders. He was followed by George E. Jacquet of the Society for Electrical Development, whose subject was "Economic Aspects of Co-operation in the Industry."

The delegates spent one afternoon in recreation and another on a tour of inspection of the Goat Rock and Bartlett's Ferry hydro-electric plants. Officers for the ensuing year will be: President, H. A. Pendergraph, Georgia Railway & Power Company; vice-president, T. W. Moore, General Electric Company, Atlanta; secretary and treasurer, W. W. Barr, Georgia Railway & Power Company (re-elected). The annual banquet of the association was held Wednesday evening.

Tacoma's Municipal Plant Adopts New Rates

By the passage of a new rate ordinance for city light and power, the City Council of Tacoma, Wash., claims to have effected a saving of $190,000 per year for residents, merchants and industrial operators in that city. The new schedule follows closely the completion of the Lake Cushman plant. It will take effect July 1, and the figure of $190,000 is estimated by Superintendent of Light Llewellyn Evans on the basis of business done by the department during 1925. The largest part of the saving, $80,000, will be made by merchants under a new commercial lighting rate.

The cut in industrial power rates averages 28.6 per cent, or more than one-fourth, and makes the schedule one of the lowest in the United States. The rate has also been simplified. Heretofore the city had a sliding power rate based upon the percentage of full-time use of maximum demand which the customer's meter indicated.

Henceforth most of the plants will have only two rates on their bill, an initial amount billed at 2 cents per kilowatt-hour and an excess amount billed at 0.5 cent per kilowatt-hour. The amount representing 70 hours' use per month of the full power demand of a plant will be charged for at an initial rate of 2 cents instead of 2.4 cents as heretofore. For any excess over 5,000 kw.-hr. in the 70-hour-per-month use the rate drops to 1 cent.

A second schedule covers the amount of power used in excess of 70 hours per month. This excess use will cost only 0.5 cent per kilowatt-hour for the first 20,000 kw.-hr., and for big users a further reduction to 0.3 cent per kilowatt-hour will be made. Customers heretofore enjoying a special "off-peak" rate will no longer get it, but the new rates will more than offset the loss.

Rural Service Takes Stride in Wisconsin

A still greater use of electricity in the rural areas served by the Wisconsin Power & Light Company and its subsidiary organizations was made certain last week when an agreement was reached between the company and five representatives of three thousand farmers in different areas upon a new uniform rate schedule for rural service, displacing the fifty different schedules now in effect. Under the new agreement all rural extension construction costs up to an average of $400 per customer will be met by the company, customers to pay any excess. One clause of the contract reads: "In consideration of the investment by the company and the fact that economical service depends on the liberal use of current, the customer intends to secure within eighteen months for regular use on his premises electrical equipment adequate to serve fully a normal customer under similar conditions."

Announcement of this arrangement was made by G. C. Neff, vice-president of the company and chairman of the rural lines committee of the N.E.L.A. Mr. Neff predicted that acceptance of the new agreement by farmers means that hundreds of those who are now using electricity solely for illumination will extend it to other purposes.

Under the provisions of the agreement adopted, which is subject to the approval of the Railroad Commission, rates will be fixed on a graduated scale, together with a service charge based on the transformer capacity required and amount of energy consumed. All energy used in excess of 50 kw.-hr. per month will cost 3½ cents and amounts below that 7½ cents, subject to a discount of ½ cent per kilowatt-hour on all bills paid within fourteen days. The monthly service rates will range from $3 to $7, depending upon the size of the transformer. They are as follows: Not more than 1½ kva., $3; over 1½ kva. and less than 3 kva., $4; over 3 kva. and not more than 5 kva., $5; over 5 kva. and not more than 7½ kva., $6; over 7½ kva. and not more than 10 kva., $7.

Purchases and Mergers

Foshay Company Enters New England Territory—South Also Figures in Both News and Rumors

IT IS reported from Burlington, Vt., that the local interests owning the Burlington Traction Company, the Military Post Street Railway and the Vergennes Electric Company have announced the sale of these properties to the W. B. Foshay Company of Minneapolis. These properties are to be consolidated into one company, known as the People's Vermont Hydro-Electric Company, which in turn will be owned by the People's Light & Power Corporation, recently organized by the W. B. Foshay Company to take over, manage and operate its utilities. All of the power generated by the three Vermont companies comes from hydro-electric plants, and, in addition to street-car service in Burlington, a number of small towns adjacent to Burlington and between there and Vergennes are furnished with electric light and power. The company owns the transmission line between Burlington and the Vergennes plant. The value of these properties is about $2,000,000, and they will represent between one-fourth and one-fifth of the total properties now being consolidated by the Foshay interests in the People's Light & Power Corporation.

The proposed absorption of the Derby (Conn.) Gas & Electric Company by the Citizens' Utilities, Inc., a subsidiary of the Utilities Power & Light Company (noted on May 29, page 1210), has been ratified by 90 per cent of the stock holdings, and control will pass within 60 days. The value of the Derby company is put at $7,600,000, or $76 a share.

Stockholders of the Augusta-Aiken Railway & Electric Corporation met in special session on Thursday of this week to take action on the acquisition by the Georgia-Carolina Power Company, a subsidiary, of the common stock of the Georgia-Carolina Electric Company. Further action was also to be taken upon the acquisition by the Georgia-Carolina Electric Company of the assets of the Carolina Light & Power Company, a South Carolina corporation, various transmission lines and distributing systems in Georgia, and a portion of the transmission line erected by the Georgia Railway & Power Company connecting with the Stevens Creek plant of the latter.

Persistent rumors are current in financial circles both North and South regarding negotiations, said to have been successful, for the purchase of control of the Georgia Light, Power & Railway Company by the Southeastern Power & Light Company. The first-named company controls the electric utilities in Macon, Ga., including the Central Georgia Power Company, the Macon Railway & Light Company and the Georgia Transmission Company, also the Macon Gas Company. Another statement is to the effect that the Southeastern Power & Light has also bought the Athens (Ga.) Railway & Electric Company. No confirmation of either sale was forthcoming as the ELECTRICAL WORLD went to press.

The Puget Sound Power & Light Company, Seattle, has acquired through purchase the entire transmission, distribution and generating system of the Sultan Electric Company. Under the purchase the Puget Sound company will serve the towns of Sultan, Startup and Gold Bar.

Empire State Association to Hold Commercial Meeting

At the Black River Valley Club, Watertown, N. Y., there will be held on June 24 and 25 the annual meeting of the Commercial Section of the Empire State Gas and Electric Association. Window displays, advertising, merchandising and home service will be topics on Thursday, and rural business and home building for utility service will be discussed on Friday. Chief Engineer C. R. Vanneman of the New York Public Service Commission will discuss the causes of some complaints to the commission, and M. S. Sloan, president Brooklyn Edison Company, will tell "what the executive would like those attending a meeting to get from it."

Floodlighting Famous Dome of Colorado's Capitol

FLOODLIGHTING in Denver took an important step forward when the combined beams of 34 General Electric projectors were focused on the 150-ft. dome of the Colorado Capitol for the first time two weeks ago. The floodlighting units include thirty projectors, each using 500-watt "Mazda" lamps, and four 1,000-watt incandescent searchlights. Of the thirty projectors, sixteen are the L-3 type, throwing a wide-angle beam, and the remainder are the L-9 type, throwing a narrow beam. Additional projectors may be set in place as state funds become available for the purpose as a means of increasing the foot-candle intensity.

From the roof line to a height of 100 ft. the dome structure is built of stone and iron and is surfaced with granite-colored paint, thus assuring a good reflecting efficiency at night. The upper cupola, which extends for another 50 ft., was surfaced with goldleaf more than twenty-five years ago at a cost of $6,000. Under a flood of light at night the entire dome will be visible for many miles in all directions. According to present plans, the floodlighting equipment will be operated regularly every night throughout the tourist season.

Donahey Makes Ohio Commission a Campaign Issue

Control of the appointment of members of the Ohio Public Utilities Commission is being made the principal campaign issue of Governor A. V. Donahey of that state, who is running for re-election for a third term on the Democratic ticket. Governor Donahey, in addition to campaigning for his own re-election, has appealed to the voters to return a Democratic Legislature to insure confirmation of his appointees to the commission. He charges conspiracy on the part of the present strongly Republican State Senate because of its failure to confirm his nominees during the past four years.

The Ohio Public Utilities Commission is made up of three members whose terms expire at different times so arranged that, theoretically, one new commissioner will be appointed by the newly elected governor every two years. Nominees must, however, be confirmed by the Senate, which has held up both of the Governor's previous appointments. The term of George T. Poor, chairman of the commission, expired two years ago, and that of C. C. Marshall expired four years ago, while the third member, Frank B. Maullar, is due to retire next February, thus leaving the appointment of an entirely new commission to the incoming Governor.

Governor Donahey charges that by the Senate's failure to confirm the appointment of his nominees to the commission he has been prevented from carrying out former campaign pledges with respect to utility regulation and that as a result certain utility companies in Ohio are enjoying privileges at the hands of the present hold-over commission that would not otherwise be possible.

Changes Made in Officers of Nebraska N.E.L.A.

At a meeting of the executive committee of the Nebraska Section of the National Electric Light Association held in Omaha recently O. J. Shaw, vice-president and general manager of the Lincoln Public Service Company, was made president of the section and K. R. MacKinnon, general superintendent of the Nebraska Power Company, vice-president. C. W. Amidon, the new general manager for Nebraska of the Central Power Company, was made a member of the executive committee to succeed C. D. SeCheverell. As the latter, the newly elected president, has removed from the state, Mr. Shaw was moved up from the vice-presidency, and as J. B. Hill, whose term as president did not expire till July 1, has also left the state, Mr. Shaw took office at once.

Business Dominates North Central Meeting

Sales Methods and the Quest for Greater Load Engage Attention of Delegates—Radio Interference and Rural Service Also Prominent in Proceedings

NEARLY 400 persons registered at the convention of the North Central Electric Association at St. Paul on June 8, 9 and 10, and many more attended the sessions. Approximately thirty addresses, papers and contributions to symposiums bearing on all phases of central-station activities figured in the program, discussion of commercial subjects or executive problems predominating. President C. S. Kennedy suggested that individual utility companies point out to their customers the distinction between good and bad holding companies and urged the adoption of uniform rate structures for developing rural load. Utility executives must think both as customers and as shareholders to fulfill their duties properly, he added. The necessity of giving more attention to obtaining new business was also stressed.

Secretary John W. Lapham pointed out that $15 and $16 per capita is spent yearly for candy and cosmetics respectively, compared with $11 for electric service, indicating that a good utility sales job has not yet been done. A telegram from President-elect Pack of the National Electric Light Association, of which the North Central is a geographic division, urged all companies to unite on a policy of serving farmers.

No wooer would make love by proxy, declared W. A. Jones, vice-president H. L. Doherty & Company, in an address on "The Electrical Industry," nor should any utility executive employ an assistant to develop good will. Nowadays a wise utility financier will demand an audit of public relations as well as of financial conditions.

Elimination of radio interference commanded considerable attention. Prof. C. M. Jansky, Jr., University of Minnesota, pointed out that the relatively little interference for which electric service equipment is responsible is due chiefly to rapid interruptions of current caused by such conditions as vibrating contacts, loose connections and leakage. Despite their small responsibility, utility companies have contributed more constructive effort to eliminating radio interference than any other interest concerned, he said.

R. A. Farmer asked, "How far can a utility economically go in limiting interference?" since it is responsible for only 5 to 15 per cent of the complaints. Colonel William Kelly of the N.E.L.A. favored encouragement of local listeners' leagues by providing them with test sets and advice. For this service the listeners can pay dues, but it will not relieve a power company of the duty of clearing at its own expense interference caused by it.

COMMERCIAL "ROUND-TABLE"

Commercial topics were extensively discussed at a full-afternoon "round table" and in a symposium later, with H. E. Young presiding. Among the subjects taken up were rural service, organizing for increased business, development of refrigeration, industrial lighting, appliances, electric cooking and power business, the jobber's function, specialists versus trained general salesmen, salaries versus commissions, the place for manufacturers' salesmen and competitive business. C. M. Dwelley, C. O. Dunten and many other speakers took part in the discussions.

Lessons learned in organizing for and seeking more business were discussed at considerable length by Mr. Dunten, who said that if existing commercial men do not produce they will be superseded. He outlined practical rules by which the sales department might be guided, including the developing of the entire man-power of a company into a selling body. Opposition to every attempt to increase domestic electrical applications can be expected from competitive businesses, Mr. Dwelley asserted, citing examples from the laundry and baking field and telling how such obstacles can be overcome by spreading the facts.

PROGRESS IN RURAL SERVICE

Prof. C. E. Stewart pointed out the shortcomings of the electric range for farm use, urging a larger oven, heating elements in the center and a bottom with a removable partition to reduce the cost of baking. Prof. Stewart also warned North Central utilities against going into rural service on an extensive scale for another three months, by which time it is expected to define a policy agreeable to most executives. W. R. McGeachin reviewed rural service progress to date in Nebraska, where 6,600-volt, single-phase service has been standardized and economic possibilities are being studied on existing lines. Unfulfilled promises made to farmers in the past and existing uneconomic rates are two big handicaps. It was pointed out that the Minnesota form of rural rate is being extensively adopted.

The value of industrial lighting activities in the Northern States Power Company's territory to the contractors and the utility was dwelt upon by R. D. Meyers. H. G. Huey outlined a program for better results on appliance sales. H. A. Dahl spoke enthusiastically regarding electric cooking possibilities in apartment houses, urban homes and on farms, emphasizing the importance of demonstrations, proper advertising and appeal to women. Oscar Gaarden presented data indicating that oil engines cost $117 per horsepower installed (rated comparatively with motors). Numerous advantages of purchased power were cited.

Lorraine Little declared that there has been a reduction of consumption per domestic customer attributed to the use of smaller lighting units since the home-lighting campaign. She emphasized the need of co-operating with architects and the difference in appeals to men and to women. J. A. Ward, represented by Mr. Streich, called attention to the need of standardizing on charges for servicing and meter deposits and urged all companies to operate as if they had municipal competition.

Under the chairmanship of L. M. Pharis, engineering committees paralleling all those of the N.E.L.A. have been established for the first time, but they have been engaged chiefly in work assigned to them by the national organization. At the round-table discussion of these committees attention was devoted almost entirely to problems of rural service.

C. J. Snyder, Minnesota Power & Light Company, Duluth, was elected president of the association for the coming year, and J. F. McGuire vice-president.

Co-operative Power Committee Formed in New England

With C. L. Edgar, president of the Edison Electric Illuminating Company of Boston, at its head, a co-operative committee embracing leading electric utility interests in New England has been formed to consider jointly with representatives of the governors of the six Northeastern States the broader problems of power development in that region. Announcement of the personnel and scope of the committee's work was made last week at the Burlington (Vt.) meeting of the New England Council, when President John S. Lawrence of the council made public a letter from Mr. Edgar upon this subject. The committee is the first ever formed to consider New England power problems as a whole, and the other members are Samuel Ferguson, president Hartford (Conn.) Electric Light Company; Martin J. Insull, president Middle West Utilities Company, and W. Rodman Peabody, vice-president and director Turners Falls (Mass.) Power & Electric Company. Henry I. Harriman, president New England Power Company, will be invited to serve on the committee as soon as he returns from abroad.

In his letter to Mr. Lawrence, Mr. Edgar stated that it was the view of those representatives of New England power interests primarily responsible for the creation of this committee that it should place itself at the disposal of the New England Council to aid it in every possible way. "It is of course premature," said Mr. Edgar, "to say just what the committee can accomplish. As chairman, however, I can say that the desire of the members of the committee is to be of the greatest possible help in clearing up any misunderstanding which may exist as to the policies of the companies or their relations with the state regulatory bodies or with the public in general in the districts in which they do business. One of the first things the committee will be asked to do is to meet with the special representatives appointed by the New England governors for joint consideration of New England power problems, and to endeavor, in co-operation with them and with the council, to work out a constructive program and bring about an understanding by the public of such program as may be agreed upon."

Committee on McGraw Award for 1926 Has Organized

The committee administering the James H. McGraw award for electrical men has just announced the terms of the awards for 1926, which are in effect the same as for last year. Under this award a bronze medal and a purse are awarded to the three men who are adjudged to have made the most constructive contributions to the advancement respectively of the manufacturing, jobbing and contractor-dealer branches of the electrical industry. A fourth medal and purse goes to the man who is recognized as having done most within the preceding year to promote harmony and co-operation between any two or more of the different branches of the industry. The decision is left each year to judges appointed for the manufacturing branch by the Electrical Manufacturers' Council, for the jobbing branch by the Electrical Supply Jobbers' Association, for the contractor-dealer branch by the Association of Electragists International, and for the medal for co-operation by the directors of the Society for Electrical Development. Certificates of honorable mention may also be given under each award, but in the event that no contribution under consideration for any medal should be regarded as worthy, the judges are empowered to make no presentation of that award.

It is the function of the judges to review the achievements in each field, and they are ready to receive suggestions from all sources. Individuals, employers and officials of electrical associations and leagues are asked to make recommendations.

Suggestions in reference to the contractor-dealer award should be sent in by Aug. 1, as this presentation will be made at the Electragists' annual convention at Cedar Point, Ohio, in that month. The other awards will close on Sept. 15. All communications should be sent directly to the James H. McGraw Award, in care of the Society for Electrical Development, 522 Fifth Avenue, New York City.

The members of the committee of awards, appointed by the Society for Electrical Development, are W. W. Freeman, Cincinnati; H. B. Crouse, Syracuse; W. E. Robertson, Buffalo; L. K. Comstock, New York; F. M. Feiker, vice-president Society for Electrical Development, and Earl E. Whitehorne, commercial editor ELECTRICAL WORLD.

A. A. E. Holds Annual Meeting at Philadelphia

Improvement of the status of the professional engineer through service to community, state and nation was, as usual, the keynote of the annual meeting of the American Association of Engineers, held this week at Philadelphia. The convention assembled on Monday morning at the Hotel Vendig and was welcomed to the Quaker City by Philip H. Gadsden, vice-president of the United Gas Improvement Company.

President D. B. Steinman declared in his official address that "the engineer has done more to promote human comfort, wealth and safety than the members of all other professions combined." He advocated revisions in nomenclature to make more clear to the layman the distinction between "engineers" and "enginemen."

Five sessions of the association were held on Tuesday and Wednesday, with the annual banquet on Wednesday evening. Thursday was spent by the delegates at Atlantic City and Friday and Saturday in New York as the guests of the chapter there. New officers elected are: President, Charles J. Ullrich, consulting engineer, Salt Lake City; first vice-president, Wallace R. Harris, Cleveland; second vice-president, Donald M. Baker, Los Angeles.

Power-Telephone Problems

Commissioner Gettle of Wisconsin on Co-ordination, Prior Right and Interference with Radio

INSTALLATION of electric lines in and through rural communities is promoting more efficient operation of rural telephone systems, declared Lewis E. Gettle, chairman of the Wisconsin Railroad Commission, in addressing the convention of the Wisconsin State Telephone Association last week. "There now are approximately 4,300 miles of primary electric transmission lines in Wisconsin and 4,000 miles of rural electric service lines," he said. "The coming of these electric lines has in many districts resulted in general overhauling of telephone systems and improvement of telephone service because it has made metallic circuits necessary."

Mr. Gettle said the commission had set up standards of safe electrical construction to meet the situation, specifying safe clearance between lines carrying various voltages and dealing with other matters of safety, but had not attempted to solve questions of inductive interference. "The rules require," he said, "that where possible and practicable electric and telephone lines shall be on opposite sides of highways," and he cited court and commission decisions to support the doctrine that the senior company has a prior right but that the junior company does not injure the senior if its system is of the best type known and if the alleged injury could be avoided were the senior company's system of the best type known.

"These decisions," he said, "make it equitable for a telephone company to bear the entire expense of making its lines full metallic circuits. The expense of moving telephone lines to the opposite side of the highway should properly be borne by the electric company. In some cases, through informal action of the commission, an electric company had borne a substantial part of the cost of metallicizing and transposing telephone lines when the electric company's high-voltage line, built to transmit energy to none of the communities along the way, had virtually put a small grounded telephone system out of business. "Both electric and telephone services are fast proving themselves to be farm necessities," said Mr. Gettle. "Companies should prepare now to provide this dual farm service in a way that will insure the maximum of safety and permanence."

Referring to the influence of radio development, Chairman Gettle said: "It has been found that the telephone companies are the principal offenders in cases of continued radio interference from standard equipment which is operating normally. So recent is the radio industry that it has not evoked legislation. Fortunately most utility operators have been disposed to adjust their equipment to reduce radio interference to a minimum. While the commission has no specific jurisdiction to require such adjustments, it has been called upon in hundreds of cases to use its influence with utility operators, and in nearly every case the commission has succeeded in having radio interference removed or greatly reduced.

"The utilities are meeting the situation and their responsibility in such a fine attitude that it seems questionable whether further requirements need be made. It is possible that it would be safe to enact such legislation as is necessary to give the commission specific authority to adjust radio reception interference, but it seems as if it would not be necessary."

American Super-Power Versus American Superpower

Complaint has been made to the Federal Trade Commission by the American Super-Power Corporation, of which Edward C. Randall is president and Henry L. Doherty chairman of the board of directors, against the American Superpower Corporation because of its virtually identical name, the complainant asserting a prior right to the designation. The American Super-Power Corporation, a Buffalo organization, was incorporated in New York to develop boundary waters, and its Niagara and St. Lawrence applications are now pending before the state Water Power Commission. The American Superpower Corporation was incorporated in Delaware in November, 1923, as an investment company and has interests in prominent utility holding and operating companies. Some confusion has been caused by the duplication of title, and newspaper readers have been led by it to infer that the water-power company was interlocked with the concerns in which its namesake holds shares.

More Lighting Features of the Sesqui-Centennial

In addition to the mammoth reproduction of the Liberty Bell and to the "tower of light" described in the ELECTRICAL WORLD for June 5, page 1259, other spectacular lighting features will serve to enhance the attractiveness of the Sesqui-Centennial at Philadelphia, which in a few weeks will be in full swing. One of these is an illuminated electric fountain in the center of the "Gladway," just off Broad Street. This fifty-thousand-dollar structure, designed by Samuel J. Hall, with its twelve different schemes of water displays and a hundred varying color arrangements which merge into one

another, forms one of the main embellishments of the exposition's amusement section. Another spectacular display will mark the southern end of Broad Street at the United States government's Transportation Building. Quite different from both of these is the "color organ" in the Auditorium, which floods the building with colored light in character with the music and is expected to reveal new advances in the harmonization of color and sound.

L. T. Darrin, electrical engineer-in-chief of the Sesqui-Centennial, and his corps of assistants faced a formidable task in laying out the scheme for the spectacular lighting features of the exposition as well as for the complicated lighting and power system of the grounds and buildings. The main feeder cables from the Philadelphia Electric Company's Schuylkill power house are operated at 13,200 volts, and 21 transformer stations are necessary to step down the energy for exposition use. Approximately 20 miles of smaller cable is laid in the grounds, and the cost of the entire Sesqui-Centennial lighting installation is put at $900,000. Every safeguard has been taken to insure uninterrupted service.

Kansas City Utilities May Back Osage River Project

Plans for a 125,000-hp. hydro-electric development on the Osage River near Bagnell, Mo., frequently referred to in these columns, have, it is said, attained new impetus through the probable financial participation of the Kansas City Power & Light Company and its holding organization, the United Power & Light Company of Illinois, as well as the Kansas City Public Service Company. The Kansas City companies are faced with a shortage of power and are said to see in the Osage project a method of adding to their output.

William G. Woolfolk, president of the Kansas City Public Service Company, which is concerned in the reorganization of the Kansas City Railways Company, is quoted as saying that his company has entered into a tentative agreement with the Kansas City Power & Light Company and with the Missouri Hydro-Electric Company, the promoter of the Osage project. This agreement will, it is thought, make it feasible to raise the $20,000,000 capital needed for the plant. The hydro-electric company, of which Walter Cravens is president, expects, it is asserted, to furnish electrical energy in Kansas City at less than 8 mills a kilowatt-hour, enabling the local companies to save several hundred thousand dollars annually and permitting the power and light company to meet its anticipated excess-load requirements and the railway company to operate its entire system.

The proposed dam would be 120 miles from Kansas City and 138 miles from St. Louis. Present plans are for five 25,000-hp. turbines. Additional dams in the Current River, 100 miles south, to generate 58,000 hp., are also contemplated. A reservoir would be formed on the Osage 120 miles long, covering 55,000 acres and with an approximate shore line of 970 miles. This reservoir would wipe out Linn Creek, the county seat, which has a population of 500. More than 75 per cent of the land to be inundated is now owned or under the option of the promoting company, which is said to have spent $2,626,315 in preliminary purchases and work.

Briefer News

New York Electrical Society Elects Officers. — Officers for 1926-27 were elected at the annual meeting of the New York Electrical Society on Monday as follows: President, S. P. Grace; vice-presidents, E. E. Dorting, E. E. Free and J. P. Alexander; secretary, H. E. Farrer; treasurer, David Darlington.

Aberdeen, Wash., to Vote on Wynooche Development June 29.—The proposed issue of $2,000,000 in bonds for a municipal hydro-electric development on the Wynooche River will be voted on by the citizens of Aberdeen, Wash., on June 29. Reports on the cost are at variance, earlier ones placing it at $2,000,000, while Stevens & Koon, consulting engineers, Portland, have estimated actual construction costs of nearly $5,000,000, with an additional sum necessary to carry the project over several unproductive years.

Threat of Another Drought in Southeast Is Met Confidently.—Despite the fact that northeast Georgia is passing through one of the dryest periods in its history, the reservoirs of the Georgia Railway & Power Company on the Tallulah River are almost full, according to Preston S. Arkwright, president of the company, and there will be no danger of a power shortage in the section at any time in the near future. Rainfall for the year on watersheds of the company, Mr. Arkwright said, has been 20 per cent below normal, and the drought extends over a wide section in North Carolina, South Carolina, Georgia and Alabama. However, as a result of interconnected power systems and the utilization of power from the Muscle Shoals plant, water in the reservoirs of all companies in the section is being used sparingly and with the greatest possible efficiency, and it is not expected that there will be such a shortage of power as existed last year in the four states. Without the interconnections in the Southern superpower system, Mr. Arkwright, said, the reservoirs of his company would be depleted and the hydro-electric plants would face a shutdown.

Coming Meetings of Electrical and Allied Societies

[A complete directory of electrical associations, with their secretaries, is published in the first issue of each volume. For latest list see ELECTRICAL WORLD, Jan. 2, page 80.]

American Institute of Electrical Engineers—White Sulphur Springs, W. Va., June 21-25. F. L. Hutchinson, 33 West 39th St., New York.

American Society for Testing Materials — Chalfonte-Haddon Hall, Atlantic City, June 21-25. C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

National Council of Lighting Fixture Manufacturers—Montreal, June 23-26. H. B. Garrett, 424 Guarantee Title Bldg., Cleveland.

American Society of Agricultural Engineers—Lake Tahoe, Cal., June 23-26.

Empire State Gas and Electric Association, Commercial Section—Black River Valley Club, Watertown, N. Y., June 24-25. C. H. B. Chapin, Grand Central Terminal, New York.

Michigan Electric Light Association—Grand Hotel, Mackinac Island, June 24-26. Herbert Silvester, Edison Bldg., Ann Arbor, Mich.

American Society of Mechanical Engineers—San Francisco, June 28-July 1. C. W. Rice, 29 West 39th St., New York.

East Central Division, N. E. L. A.—Cedar Point, Ohio, July 13-17. D. L. Gaskill, Greenville, Ohio.

Prominent American Electrical Engineers Made Members of German Museum Board.—A luncheon in honor of Dr. Ing. Paul Reusch, retiring president of the Deutsches Museum in Munich and one of the foremost industrialists of Germany, was given at the Chamber of Commerce in New York on June 10 by the trustees of the Museums of the Peaceful Arts. A feature of the luncheon was the presentation by Dr. Reusch of certificates of membership on the board of the Deutsches Museum in Munich, Germany, to Elbert H. Gary, Prof. Michael I. Pupin, John W. Lieb, E. W. Rice, Jr., and Calvin W. Rice. Mr. Gary and L. F. Loree, president Delaware & Hudson Railroad, spoke. Among others present were Dr. Herman Reusch, Elmer A. Sperry, Charles R. Richards and L. W. W. Morrow.

Proposals to Be Made for Sacramento Municipal Power. — Officials of the Great Western Power Company and the Pacific Gas & Electric Company have notified the directors of the Sacramento Municipal Utility District that they are willing to make an investigation of the district's Silver Creek domestic water and power project and make offers for the power to be developed or for lease of the water. The utility district, as previously reported, proposes to develop 91,534 hp. in connection with a domestic water-supply project at a cost of $27,100,000, but is unable to finance a development of this magnitude and has called for bids for the power from the private companies operating in the territory.

Hydro-Electric Power for Kapuskasing Mills in North Ontario. — To the Spruce Falls Power & Paper Company, Ltd., has been granted a provincial charter for operations at and near Kapuskasing, Ontario, involving an investment of $25,000,000, the daily production of 500 tons of newsprint and the development of hydro-electric energy. In this connection it is announced that the Kimberly-Clark Company of Neenah, Wis., owners of all the capital stock of the Spruce Falls Company, which now operates a sulphite mill at Kapuskasing, have entered into an agreement to transfer all of the assets of the latter company to the Spruce Falls Power & Paper Company. Kapuskasing is situated about 60 miles west of Cochrane. The hydro sites to be developed, at Smoky Falls and Devil Rapids, are 40 miles north of the mill site.

Quebec to Build 2,000 Miles of Transmission Lines This Year.—So far this year the Quebec Public Service Commission has granted more permits for the erection of transmission lines than were granted during the entire course of 1925. Last year permits for 440 miles were granted. It is estimated that the 1926 total will be close to 2,000 miles. This year's applications include that of the Shawinigan Water & Power Company for its projected 165,000-volt line from Ile Maligne on the Saguenay River to Quebec and that of the Northern Canada Power Company for a 100,000-volt line from the company's plant at Rapides des Quinze into the Rouyn district.

Progress at Cherokee Bluffs.—Construction forces of the Alabama Power Company report that 40 ft. of the 150-ft. dam at Cherokee Bluffs has been closed and that the Tallapoosa River is being slowly backed into a 10-mile lake. Progress is expected to be more rapid as the work gathers headway because of the sectional method followed in building the dam. When the dam reaches the height of the draft-tube openings, which is 90 ft., the river flow can be carried off through the tubes and work speeded up. Unless heavy floods develop it is thought the basin will not be filled until near the end of the year on account of its immense capacity—530,000,000 gal. of water.

Wisconsin's Water-Power Law to Go to United States Supreme Court.—The attack on the constitutionality of the recapture clause of Wisconsin's water-power law, which was repulsed two months ago in a decision handed down by the Wisconsin Supreme Court, will be taken to the United States Supreme Court by the Fox River Paper Company of Appleton. This case, which has aroused much interest among hydro-electric companies, arose out of a dispute between the Railroad Commission and the paper company because of the company's desire to build a new dam on the site of one constructed prior to the inception of the present water-power law. The commission insisted that no legislative franchise had been granted for the original dam, that a new permit was necessary and that the company must agree to surrender its property to the state thirty years hence at present-day values.

Graduate Instruction in Moore School of Electrical Engineering. — Beginning with the academic year 1926-27, graduate instruction will be offered in the Moore School of Electrical Engineering, University of Pennsylvania. The degree awarded will be master of science in electrical engineering. A prescribed course will be offered, the purpose of which is to prepare young men for engineering research or for teaching. The course includes introduction to mathematical physics, advanced mathematics for engineers, advanced electric circuit theory, electron theory and its engineering applications, and a thesis. To be admitted to this graduate course the applicant must have completed with credit an undergraduate course in electrical engineering substantially equivalent to that given in the Moore School. In order to encourage students who are properly qualified to add a fifth year to their university training, four graduate fellowships are offered. Each fellowship carries free tuition and a cash stipend of $500, payable in equal installments Oct. 1 and Feb. 1. Applications for these fellowships should be addressed to the Dean, Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia.

Kansas Has Novel Electrically Lighted Signpost.—At the junction of several important and well-traveled highways just outside of Fort Scott, Kan., a signpost of unusual design has been erected. A metal box surmounts a column of brick, and in the sides of the box are cut-out letters backed with glass which present the names of the principal points along the highway plainly to the motorist. At night

electric lamps shine through the glass letters so that the sign may be easily read by passing tourists without getting out of their cars.

Dispute Over Upstate New York Territory Settled.—The New York Public Service Commission has denied a petition from the Malone Light & Power Company for authority to serve the village of Chateaugay and has confirmed the Chasm Power Company in possession of that territory on the ground that there is no public necessity or convenience to be served by the construction of another plant. The Chasm Power Company's franchise from the village expired four years ago, but the company has continued to render service there. It is controlled by interests affiliated with the Associated Gas & Electric Company and operated as a branch of the Plattsburg Gas & Electric Company. The Malone Light & Power Company is a subsidiary of the Power Corporation of New York, one of the Carlisle organizations.

Ford Utility Company Must Pay $41,000 for Property It Condemned for $2,800.—The Ford Hydro-Electric Company has lost a long fight in the federal courts of Wisconsin to have set aside an award of $41,000 made in favor of the Neely estate for lands acquired by condemnation proceedings on the Menominee River for the construction of a dam and power plant. Failing to purchase these lands at a price satisfactory to it, the company became a public utility and instituted condemnation proceedings. From an award of only $2,800 the Neely heirs appealed to the United States District court at Milwaukee, which returned a judgment of $41,000, and this award has now been confirmed by the United States Court of Appeals.

Herkimer, N. Y., Turns to Private Plant for Emergency Service.—The Village Board and Municipal Commission of Herkimer, N. Y., have gone on record as opposed to a bond issue of $80,000 for the installation of additional generating power at the municipal lighting plant, and have indorsed a proposal from the Utica Gas & Electric Company to furnish standby electric service at a low rate. It was pointed out that $50,000 of the proposed bond issue would be for new machinery that would stand idle except in rare cases, thus becoming an uneconomical investment.

Survey of Brazos River, Texas, to Be Made.—A survey of the proposed dam and water-storage reservoir on the Brazos River, 6 miles west of Mineral Wells, Tex., is to be made by the State Board of Water Engineers, on application of Jay Alexander of Dallas, secretary-treasurer of the Syndicate Power Company, which is owned by the Insull interests of Chicago. In the application it is indicated that the water may be used for generating electric power and for irrigation purposes. Preliminary surveys show this to be the largest reservoir projected in Texas, with a total possible content of 4,500,000 acre-ft., but the investigation contemplates a reservoir of probably about 1,500,000 acre-ft.

Electrical League Conference. — The immediate response to the invitations to attend Camp Co-operation VI, the fifth conference of electrical leagues, extended by the directors of the Society for Electrical Development to electrical league officials and others interested in local co-operative business development, indicates the growing interest of the industry in this work. Within a week 53 requests for reservations were received from 20 leagues in the United States and Canada. The committee is preparing a well-balanced business program, which will include reports of outstanding developments in the past year and offer practical suggestions and plans for the ensuing year.

Closing 85-Mile Gap in Interstate Transmission Line.—Progress is announced in the construction of the 66,000-volt transmission line which is to extend from the Muddy power station of the Illinois Central Public Service Company, near Harrisburg, in southern Illinois, north to Olney, a distance of approximately 85 miles. At Olney this line will make connection with the 66,000-volt line extending from Olney to Effingham, a distance of 40 miles. The link will close a gap in a continuous transmission system extending 600 miles from Wisconsin to Kentucky and interconnecting plants of the Wisconsin Power & Light Company, the Public Service Company of Northern Illinois, the Central Illinois Light Company, the Illinois Electric Power Company, the Central Illinois Public Service Company and the Kentucky Utilities Company.

Men of the Industry

F. A. Matthes in Virginia

Fred A. Matthes, for many years associated as vice-president and manager of the Tide Water Power Company at Wilmington, N. C., which utility is operated by the General Engineering & Management Corporation, has been assigned to the Virginia territory of that holding company, with headquarters at Charlottesville. He entered upon his public utility work as an employee of the Choctaw Railway & Light Company, McAlester, Okla., subsequently becoming manager of the Longview (Tex.) Light & Ice Company. Later he was promoted to be president and manager of the American Public Service Company of Abilene, Tex.

Mr. Matthes affiliated himself with the Fitkin interests in 1918 in the capacity of president and manager of the properties at Laredo, Tex., and after several years of successful work witn these companies he was transferred to the executive control of the Tide Water Power Company. During four years' supervision of the North Carolina organization he established a remarkable record in the development of business, economy of operation and establishment of cordial relations with the public.

C. A. Magrath, chairman of the Ontario Hydro-Electric Power Commission, has been awarded the degree of doctor of laws by the University of Toronto.

William W. Bodine is now general manager of the United Gas Improvement Company, Philadelphia, in addition to holding a vice-presidency in the company.

J. H. Manning, vice-president division of engineering and construction, Stone & Webster, will shortly transfer his headquarters from Boston to the New York office of the company at 120 Broadway.

John A. Clark, Jr., has been appointed vice-president of the Public Service Electric & Gas Company, Newark, N. J., in charge of the operations of the gas department, to succeed the late Henry D. Whitcomb.

J. A. Turner has been appointed supervising engineer in charge of the resident work on the Chelan power project of the Washington Water Power Company, Spokane. Mr. Turner was associated in an engineering capacity with that company when the Post Falls, Long Lake and Little Falls stations were constructed.

A. E. Gerg, who has been associated with the Wisconsin Power and Light Company for many years as commercial manager, has been appointed district commercial manager in charge of all commercial sales in Fond du Lac and the neighboring communities. **F. J. Cottrill** of Cedar Rapids, Iowa, has been selected to succeed Mr. Gerg.

C. J. Ullrich, member of the firm of McGonagle & Ullrich, consulting engineers, Salt Lake City, Utah, has been elected president of the American Association of Engineers for the ensuing year. Mr. Ullrich began his engineering work with the Leonard Construction Company of Chicago immediately after his graduation from college. He served as resident engineer on the construction of the Idaho Falls municipal hydro-electric plant and pumping station on the Snake River and as office engineer for the Utah State Road Commission. In 1913 he was appointed Deputy State Engineer of Utah, which position he held until 1921. Since that time he has been a member of the firm of McGonagle & Ullrich. Mr. Ullrich is also an attorney-at-law and confines his legal practice to engineering matters entirely.

C. J. Snyder Heads North Central Association

Carl J. Snyder, division manager of the Minnesota Power & Light Company, Duluth, was elected president of the North Central Electric Association at the convention held last week in St. Paul. Mr. Snyder has been affiliated with the electric properties at Duluth since the spring of 1923, when he resigned as chief engineer of the Nebraska Power Company at Omaha to become manager of the commercial service department of what was then the Duluth Edison Electric Company, the present Minnnesota Power & Light Company. At the time of his resignation he had rounded out a period of service in Omaha covering fourteen years, during which he had engaged in construction, operation and engineering work. Mr. Snyder is a native of Garrison, Iowa, and was educated at the University of Wisconsin and at the Iowa State College. He has taken an active part in the work of several of the technical committees of the National Electric Light Association, and he is a member of the American Institute of Electrical Engineers.

C. J. SNYDER

Arthur Wegner has taken up industrial engineering work with the commercial department of the Washington Water Power Company, Spokane, leaving his position in the engineering department of that company.

E. B. Whitman Heads Kentucky Utility

Ezra B. Whitman, a member of the Maryland Public Service Commission, has been named president of the Kentucky Electric Power Corporation, Nortonville, Ky., incorporated last January under Delaware laws. Mr. Whitman is a member of the firm of Norton, Bird & Whitman, engineers of Baltimore, Chicago and New York, and has been identified with the Maryland Public Service Commission since 1921. He is a graduate of Cornell University and for more than ten years has engaged in private consulting practice along sanitary, municipal and hydraulic lines.

Samuel Insull has been honored by the University of Notre Dame, South Bend, Ind., by being made the recipient of the honorary degree of master of science in recognition of services performed for his fellow men.

George W. Saam was elected secretary of the American States Securities Corporation at the meeting of the board of directors held June 9. It was at this meeting that Frank T. Hulswit was elected to the presidency of the corporation.

Owen D. Young, chairman of the board of directors of the General Electric Company, received the honorary degree of doctor of laws from Rutgers College at the commencement exercises June 12, and **Michael I. Pupin**, president of the American Institute of Electrical Engineers, received the honorary degree of doctor of science from that institution.

Dr. Leonard F. Fuller, formerly engaged in carrier-current research for the General Electric Company at Schenectady, N. Y., has again affiliated himself with that company and will be connected with the engineering department as Pacific Coast representative. Dr. Fuller is nationally known for his accomplishments in the field of radio engineering, in recognition of which he received the Morris Liebmann prize for 1919.

C. E. Skinner, chairman of the American Engineering Standards Committee, was appointed delegate to the international conference on standardization to be held in Europe this summer at a luncheon given in the Engineers' Club, New York, by members of that committee June 10. Mr. Skinner is well known for his accomplishments in the electrical field and has frequently served as an American delegate to international engineering conferences abroad. He has been affiliated with the Westinghouse Electric & Manufacturing Company since 1890 and is at the present time assistant director of engineering.

A. E. Hitchner, an executive of the East Pittsburgh headquarters of the Westinghouse Electric & Manufacturing Company, has been promoted to the managership of the company's Los Angeles office, the post having been made vacant by the resignation of K. E. Van Kuran. A native of New Jersey, Mr. Hitchner spent his early years on the Atlantic Coast and was graduated in electrical engineering from Rutgers in 1904. He joined the Westinghouse

company in 1909 and was assigned to general industrial sales work in the Philadelphia office. In 1912 he was placed in charge of anthracite mining sales projects of the company, this work carrying him to the northeastern section of Pennsylvania. Later he established the Wilkesbarre (Pa.) sub-office of the company. In 1919 he was transferred to the East Pittsburgh headquarters of the Westinghouse company as assistant to the manager of the industrial department.

Stone & Webster Add to Engineering Staff

The addition of several new members to the engineering staff of Stone & Webster has recently been announced. **William S. Maddocks,** formerly electrical engineer with the Lockwood, Greene & Company Engineers, Boston, has terminated his services with that organization to became associated with Stone & Webster as engineer in the electrical division. Mr. Maddocks is well known in Eastern electrical circles for his work in textile power and lighting applications on the Atlantic seaboard district. **Erwin A. Childerhose,** for the past three years electrical engineer with the Pennsylvania Water & Power Company and formerly with the Manitoba Power Commission, has entered the electrical division of Stone & Webster, and **Edward G. Lee,** formerly chief designing engineer and assistant to the chief engineer of the Central Maine Power Company, Waterville, Me., has joined Stone & Webster's organization as engineer in the hydraulic divsion.

E. D. Johnstone, formerly resident engineer with the Frederick Snare Corporation for the Hudson Avenue station of the Brooklyn Edison Company, has joined the staff of Thomas E. Murray, Inc., in the capacity of resident engineer on the firm's various undertakings.

George C. Maus, for the past four years assistant electrical engineer with the Lockwood, Greene & Company Engineers, Boston, has been appointed electrical engineer of the company, to succeed W. S. Maddocks, who has joined the staff of Stone & Webster.

James McNair of the Washington Water Power Company, Spokane, has been transferred from the engineering department of that company to a position which places him in charge of maintenance and operating work of the light and power department that formerly was handled by the engineering department.

G. L. Knight, mechanical engineer of the Brooklyn Edison Company, has been elected vice-president of the third geographical district of the American Institute of Electrical Engineers. This district embraces the entire city of New York. Mr. Knight, whose term of office as vice-president takes effect on Aug. 1, is a member of the board of directors of the A.I.E.E. and at present is serving as chairman of the finance committee.

George Bakewell, Jr., of Denver, for two years field representative of the Electrical League of Colorado, has been appointed representative of that organization, handling the duties of the late S. W. Bishop. Mr. Bakewell, upon being discharged from the army, started his career in the employ of the Emerson Electric Company, St. Louis. Shortly thereafter he moved to Denver and entered the newspaper field. In 1922 he became associated with one of the local advertising agencies and continued in that activity until his appointment Aug. 21, 1924. as league field representative.

Erwin G. Fleming has been transferred from the central-station engineering department of the General Electric Company at Schenectady to the Jacksonville (Fla.) office. Mr. Fleming will stay at Miami.

L. A. White, general superintendent of the Oklahoma Gas & Electric Company at Ardmore, Okla., has been transferred to the company's head offices at Oklahoma City. Mr. White's former position will be abolished and the work of the operating department previously handled by him will be divided among the department heads.

Dr. Gardner C. Anthony, dean of the Tufts Engineering School since its organization twenty-three years ago, has resigned, effective Sept. 1. Dr. Anthony is a past-president of the Society for the Promotion of Engineering Education and is widely known in mechanical and collaterial electrical engineering circles. He was educated at Brown University, Providence, and Tufts College, Medford, Mass., and has written extensively upon engineering topics.

George H. Eveland, at different times associated with the Pelton Water Wheel Company, the General Electric Company and the United States Reclamation Service and until recently associated with the Pacific Gas & Electric Company, San Francisco, has resigned to join the staff of the Constant Angle Arch Dam Company of that city. This company is at present engaged in designing and supervising the construction of the Feather River Power Company's Buck Creek plant in Plumas County, Cal., and Mr. Eveland will be designing engineer for the power plant and substation.

Leonard H. Church, for the past three years a member of the faculty of the electrical engineering department of the Kansas State Agricultural College, Manhattan, Kan., has joined the editorial staff of the ELECTRICAL WORLD for the summer, with headquarters in New York. In addition to his work as an educator Mr. Church served as a consulting engineer on the Red Wing rural project in Minnesota and has specialized in rural electrification in Kansas as a member of a special commission appointed by the Governor. During the past six months he has been engaged in the preparation of a bulletin on electric fireless cookers. Mr. Church is a native of Winona, Minn., and a graduate of Purdue University, Lafayette, Ind.

Frank A. Ketcham, executive vice-president of the Graybar Electric Company, has been made a bachelor of science in mechanical engineering by the University of Michigan. The conferring of this degree on Mr. Ketcham is in recognition of his contributions in the field of mechanical and engineering science.

B. D. Christian Sales Manager of Crocker-Wheeler Company

B. D. Christian has been appointed sales manager of the Crocker-Wheeler Electric Manufacturing Company, with headquarters at Ampere, N. J., his term of office having begun on June 1. Mr. Christian is well qualified by training and experience to direct the sales work of the Crocker-Wheeler organization, bringing to his new executive position a broad background in central-station operation as well as in sales engineering. His association with the company dates back to 1914, when he became sales engineer in the Chicago office. After spending four years there he was transferred to Cleveland and was made manager of that district, the position he held until his recent promotion. Among the other phases of sales work in which Mr. Christian has engaged is the handling of the sales engineering details of numerous motor applications.

James B. Bronson, who has been connected with the Dayton Power & Light Company for the past four years as power engineer and also in charge of the company's rural service development, has resigned to accept the position of commercial manager with Gannett, Seelye & Fleming, Inc., engineers of Harrisburg, Pa., in charge of their Missouri properties.

Leon L. Hay, formerly sales manager of the Southern Nebraska Power Company of Superior, Neb., has been appointed sales manager of the Carlisle interests that have headquarters at Watertown, N. Y. **W. Nye Smith** will have charge of the illumination and engineering departments, of the Watertown (N. Y.) district of the Northeastern Power Corporation, which with the Carlisle interests are closely linked.

Obituary

Samuel H. Dannatt, manager of the New York office of the Electric Service Supplies Company, died May 30 at his home in Mount Vernon, N. Y. Mr. Dannatt has been associated with this company for five years and had made many friends among his customers. He was 43 years of age. Prior to his connection with the Electric Service Supplies Company he was associated with the Westinghouse Electric & Manufacturing Company, the Electric Power Equipment Corporation and the Una Welding & Bonding Company.

George S. Smith, for many years president of the New England Company, the former holding organization of the New England Power Company system, died suddenly June 8 at Auburndale, Mass., as a result of a heart attack while on the links of the Woodland Golf Club. Mr. Smith was born in Boston in 1863 and was a leading figure in the banking and mercantile life of the city. He was a past-president of the Boston Chamber of Commerce and had been associated with the Chace-Harriman interests since the earlier days of the New England Power Company's hydro-electric development.

Commission Rulings

Engineering and Management Charges in Nebraska.—With regard to the summary of a statement of the Nebraska Railway Commission concerning engineering and management charges of the Northwestern Public Service Company which appeared in "Commission Rulings" for May 29 (page 1216), the Electric Management & Engineering Corporation of New York, the managing company whose charges were the subject of the commission's observations, writes: "The statements contained in this article are to a considerable extent incorrect for the following reasons: The commission made no finding as to the management fee based upon gross revenues, and the management fee was not an issue in the application before the commission. The engineering charge of 15 per cent was limited to 7½ per cent as the basis for the issuance of securities only, while the 2 per cent for accounting and administration was approved. The commission allowed bonds the proceeds from which would reimburse the company for approximately 80 per cent of the construction expenditures, and stock for the balance of the construction expenditures."

Apportioning Local Expenses of Power Company Serving Municipal Plant and Others.—The Northern States Power Company asked the Wisconsin Public Service Commission for authority to increase its rates to the municipal plant of the city of Barron, where it also serves other consumers. In granting the request the commission made these decisions: Generated and purchased power expenses were apportioned upon relative consumptions of energy; transmission-line expenses chargeable to various lines were apportioned among joint users on the basis of their respective demands; utilization, commercial and new-business expenses were apportioned on a basis representing the commission's estimate of these costs; general and miscellaneous expenses were apportioned as an overhead to all other expenses; the same bases for apportionment of return, retirement reserve and taxes were used in allocating these items to the municipal plant as were used in apportioning corresponding items of operating expenses of the electric utility serving the plant and other consumers.

Exclusion of Property Not Used or Useful.—In finding a rate base for the Pacific Power & Light Company's Yakima-Walla Walla system, the Washington Department of Public Works, asserting that property formerly used by a utility but not now used or useful should not be included in the rate base made these decisions: (1) The development cost of two electric power plants, one of which was not used or useful, was apportioned on the basis of plant value. (2) The value of water rights of two hydro-electric companies, one of which was not used or useful, was apportioned by determining the value of the right for each plant on the basis of the methods used by the different engineers and then taking the average of these amounts. (3) A hydro-electric plant, used for emergency service on an average of 2,003 hours run yearly, was included at $300 per kilowatt of rated capacity, it being held that the investment of $884 per kilowatt rated capacity, $1,547 per kilowatt normal operating load and $967 per kilowatt peak load were excessive. (4) A steam plant which had run only seven hours a year on an average and which had generated only 1,913 kw.-hr. on an average was excluded, although it had the capacity to supply a small town, since that community could be served by any one of three transmission lines.

"Going Value" and Engineering and Superintendence Charges for Small Plant Disallowed.—Asserting that the Malta Light & Power Company was netting 28¼ per cent on the rate base found by the commission, the Montana Public Service Commission both ordered a reduction in rates and revised its previous valuation. Among other reductions it made no allowance for "going value" and none for engineering or superintendence. The latter items, the commission said, were not, according to its experience, present in plants like the one in question, and going value had not been established.

Recent Court Decisions

Colorado Supreme Court Sustains Condemnation of Private Plant by City of Loveland.—Many technical points raised by the Public Service Company of Colorado in appealing against the authority granted the city of Loveland to take over the company's local plant have been overruled by the Supreme Court of Colorado, which sustained the condemnation of the plant. The court held that the determination of the city authorities as to what property should be taken for operation of the plant was conclusive, unless fraudulent or unreasonable. Damages to the remainder of a state-wide system by what was done elsewhere than on the part taken could not be considered. Every presumption was in favor of the award, and its invalidity could be established only by clear evidence. (245 Pac. 493.)*

Nebraska County Loses Motion to Validate Lighting District Bond Issue.—The last vestiges of the Nebraska law enacted in 1921 permitting the creation of rural electric lighting districts and prescribing conditions under which bonds might be issued to pay the cost of a distribution system has been wiped off the statute books by the action of the Supreme Court of the state in refusing a rehearing on its decision that the law was invalid. The original law was declared unconstitutional two years ago because it did not provide any tribunal to which an aggrieved property owner might appeal from inclusion in the district and hence deprived him of his property without due process of law. Only one district, in Saunders County, was ever formed, and to validate a bond issue by it an amendment to the act was passed by the Legislature. The Supreme Court says this was futile because a void law cannot be amended. (See ELECTRICAL WORLD, May 29, page 1213.)

Where Facts Are Equally Consistent with Theory of Accident and Theory of Decedent's Fault Jury Must Decide.—Hussey vs. Boston & Maine Railroad was a suit to recover damages for death of a lineman who was killed while making repairs on a transformer by coming into contact with high-tension wires while ascending a ladder to attach a lamp to a socket. It was contended by the defense that the man could have made another and safer connection for the lamp, but this was disputed. The Supreme Court of New Hampshire sustained a verdict for the plaintiff against the contention that the trial court should have directed a verdict for the railroad company on the ground that the victim knowingly and without reasonable occasion encountered the danger. The Supreme Court held that allowing a light socket to remain near high-tension wires was *prima facie* evidence of negligence on the part of the company and that where the facts would sustain equally a theory of accident and a theory of contributory negligence it is the jury's province to decide. (133 At. 9.)

Special Legislation in Interest of Municipal Plant Unconstitutional.—In declaring unconstitutional the act of the Legislature of Maryland designed to permit the city of Hagerstown to build a new municipal plant in defiance of the Public Service Commission, the Maryland Court of Appeals said the act constituted special legislation in that it did not apply to other municipalities. The court observed: "The only reason that can even plausibly be urged by Hagerstown that could not be easily acquired for itself and used as an argument for exemption by any other municipality is that Hagerstown for a long time, and successfully, has been running a municipal plant. But there is nothing to prevent its continuing to do so without any special legislation. According to the city's own showing, it is not hampered in any way in meeting economically all the purely municipal needs and a large private business besides. The only complaint it makes is that it is not permitted to spread out and do a much larger private business in conjunction with another plant already in existence and abundantly equipped to furnish the additional service required, without anything to show that the other plant is not giving equally good and economical service to those whom the city cannot serve by reason of its limited capacity. It is just such wasteful duplication which it is one of the principal functions of the Public Service Commission to prevent. However, if the commission acted arbitrarily and without justification, the city's remedy was by resort to the courts and not to the Legislature."

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the Nationaly Reporter System.

Financial and Corporate

Utility Market Improves

More Active Trading in Utilities Accompanies Rise in Shares—Gains Mostly Moderate

A DISTINCTLY better tone in the stock market generally during the week under review may be traced in part to the satisfaction over the Mellon announcement that the government would do no June 15 financing this year. That news was interpreted to mean that the Secretary of the Treasury, who is recognized as a shrewd judge of the money market, does not anticipate any great tightening in rates at least for several months. The prospect for continued easy money for a time and the signs of some improvement in the retail demand for goods were looked upon as factors favorable to the speculative and investment markets.

On the New York Stock Exchange Public Service Corporation of New Jersey improved its position by five points and the shares of American Water Works & Electric likewise rallied with the general list.

In the unlisted and curb markets the same general improvement was noted, although the gains for the most part were moderate. At no point in the list did the trading become excited or did prices move swiftly ahead. Nearly a three-point rise was achieved by Electric Bond & Share Corporation and by Electric Investors, Inc. Approximately three points each for the week were gained by General Gas & Electric B stock and by United Gas Improvement. More than three points were added to the position of the American Gas & Electric shares. Duke Power rose five points.

A better demand for investment preferred stocks is seen and small advances were recorded for these as well as for several of the bond issues.

New Capital Issues

The largest individual offering during a week of unusual activity in electric light and power financing was the issue of first trust mortgage gold bonds of the Nevada-California Electric Corporation totaling $23,000,000, the price being 95½ and accrued interest, to yield about 5.30 per cent. The proceeds from the sale of these bonds will be used to retire securities bearing interest at a higher rate and constituting the total bonded debt of the system in the hands of the public. A part of the funds will also be devoted to defraying the cost of new construction and for general corporate purposes.

Another sizable loan was floated by the Public Service Corporation of New Jersey in the form of secured 5½ per cent gold bonds, priced at 99 and interest, to yield about 5.57 per cent, a piece of financing involving a total of $15,000,000. The proceeds of the sale of these bonds will reimburse the corporation's treasury for advances previously made for additions and betterments to the property of the Public Service Electric & Gas Company and for other corporate purposes.

During the past week the Southeastern Power & Light Company entered the market to the extent of $12,500,000 in the form of 6 per cent gold debentures, series A, priced at 95 and accrued interest, to yield over 6.30 per cent. Proceeds from the sale of these debentures will reimburse the company for expenditures in connection with the acquisition of properties and will provide funds for other corporate purposes.

The Canada Northern Power Corporation, Ltd., issued 6½ per cent fifteen-year sinking-fund collateral trust bonds, totaling $2,500,000. The offering price was 100 and accrued interest to yield 6½ per cent. The proceeds of this issue, together with the proceeds from the sale of junior securities to be issued, are being used to purchase a controlling interest in the Northern Ontario Light & Power Company, Ltd.

Three-year 5 per cent gold coupon notes of the Savannah Electric & Power Company amounting to $1,700,000 were offered at 99¼ and accrued interest, to yield over 5¼ per cent. The proceeds from the sale of these notes will be used to pay in part for important additions to the company's station capacity and distribution system necessary to meet the increasing demand for service and to retire floating debt.

The Portland Electric Power Company issued first lien and refunding mortgage gold bonds to the amount of $3,750,000 at 97 and interest, yielding over 5.70 per cent.

Custody of Replacement Reserve

This Fund Should Be Reinvested in Company Property at Discretion of Directors Instead of Being Deposited in a Separate Banking Account Drawing Ordinary Rates of Interest

BY W. H. BALDWIN
First Vice-President Tennessee Eastern Electric Company

THE consulting engineer of a certain state public service commission is understood to have recommended that utilities be required to handle replacement reserve funds in the following way: To take monthly in cash the amount of accrual to replacement reserve and deposit it in a separate banking account, keeping it subject to being expended on specific items of replacement by orders of the commission from time to time.

Since banks rarely allow more than 3 per cent on such funds, this amounts to reduction of return upon replacement reserve from 8 per cent to 3 per cent—a loss of 5 per cent.

It appears that the engineer may not have devoted sufficient consideration to the fundamental questions involved to have them clearly thought out and has hereby fallen into an error.

It is fundamental that the rate for service to be paid by the consumer is composed of the following parts: (1) Operating expenses, including current maintenance and taxes; (2) reimbursement to the company for current general destruction of its property by usage or abandonment; (3) interest return on the fair value of the property. This is generally taken at 8 per cent.

Item 2, reimbursement for destruction of the property by use, is similar to maintenance, except that it does not occur in a series of small items from day to day, but is clearly evident only upon abandonment or replacement of major elements of the property.

The sum of items 1, 2 and 3 makes up the rate which the consumer should pay for his use of the property of the company and operation of the same in his service. These are not "contributions." They are payment for something received or used. The moneys so paid belong to the company and to no one else. The company uses money in item 1 to buy coal, pay firemen, etc., to continue operations.

Money in item 2 is payment on account of the property partly consumed by the consumer. The payment belongs absolutely to the company the property of which was partly consumed. It is money property, subject to complete control by the directors of the company. They could declare this money out as dividends in liquidation. It is a part of the property.

As a matter of fact, what the directors wish to do is to take this money and invest it in the general corpus of the property as enlargement of the same is required by community growth. Generally directors do not incline to create new property unless earning power of from 12 to 15 per cent is indicated upon new moneys spent, thus affording a margin of safety to insure a just return. This is a matter solely within the discretion of the directors and stockholders.

The replacement reserve money, being money in the hands of the company which has taken the place of property previously in their hands and partly or wholly consumed by the public, is subject to no different treatment from any other property. The commission has no more right to tell the company

that it shall keep this money in the bank at 3 per cent than it has to tell it to use any other of its property at 3 per cent. The company is just as much entitled to 8 per cent return upon this money as it is upon the property which the money replaced, or as it will be upon the new property which the money will acquire. There is no difference whatever between this money and the property from which it came or into which it will go. This proposition cannot be refuted.

If 8 per cent be a just rate of return upon the fair value of the property (in some cases it is not sufficient; in some it may be more than sufficient), the commission has no right to say that any part of the company's property, whether in the bank or in the power station, shall receive a return of only 3 per cent. If the company has been paid for partial destruction of its property through usage by the public a total of $100,000 which it holds in replacement reserve and the commission compels the company to keep this money idle in the bank at 3 per cent, the deficit of 5 per cent must be paid to the company by the consumers through rates.

But if the directors are permitted to invest this money promptly in new property earning 10 per cent or more, they are receiving a return upon this investment which reduces to that extent the rate to the consumer as against the method proposed by the commission engineer. The method advised by the commission engineer indicates higher rates to the consumer. The method indicated by the company indicates lower rates to the consumer. The method indicated by the commission engineer is contrary to the public interest. The method indicated by the company is favorable to the public interest. Only a moment's thought is required to make it clear that the above is in accordance with common sense and the principles of accounting and the fundamental law.

Take, for example, the case of a wooden pole having in place a fair value of $10 and good for ten years. This pole is placed in the service of the public. The consumer of light and power uses this pole up in ten years. Proceeding upon the straight line method of depreciation, as advocated by the commission, the consumer should, during the first year, in addition to that part of his rate for lighting and power, made up of item 1, operating expenses, pay item 2 $1 for having used up one-tenth of this pole; and so for other things. This $1 is not a "contribution." It is payment to the company for having used up its pole to this extent. The money belongs to the company as much as the pole did; it is simply a change in form of assets. Both the money and the pole are property. The difficulty of the consulting engineer arises from his attempt to accord a different treatment to money property than that which he accords to pole property. It is the duty of the directors of the company to put this $1 of money property to good use, so that it will earn a fair return to the stockholders to whom it belongs. And so for the $1 of the second year.

At the end of ten years the directors will be able to buy a new pole with the $10 which the consumer will have paid the company for having used up its pole. It makes no difference that this $10 has been profitably employed at 10 per cent all that time by being invested, whether in farm loans or in transformers across the street, so long as it is profitably invested in something and not kept in the bank at 3 per cent.

If the directors voluntarily keep it in the bank—that is to say, in a separate bank account and not deposited along with current funds as necessary bank balances essential to the conduct

Stock Quotations of Electric Light and Power and Manufacturing Companies*

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Saturday June 12	Low 1926	High 1926
ABITIBI PWR. & PAPER, com. —no par	k 72	70¼	84½
Adirondack Pwr. & Lt.—7% pf.	k105	....	....
Adirondack Pwr. & Lt.—8% pf.	k113	....	....
Ala. Pwr., pf.	k107½	....	....
Allis-Chalmers Mfg. pf.	k109¼	....	....
Allis-Chalmers Mfg., com.	k 87¼	78¼	94½
Aluminum Co. of Amer., com.	k 74¼	63	76
Aluminum Co. of Amer. new, pf.	k 99½	98½	101
Amer. & Foreign Pwr., pf. 25% pd.	m108	108	131
Amer. & Foreign Pwr., 7% pf.—no par	91¼	89	98
Amer. & Foreign Pwr., com.—no par	k 22½	15½	42½
Amer. Bosch Magneto, com—no par	k 20	16	34½
Amer. Brown Boveri, Elec.	k 41½	30½	48½
Amer. Brown Boveri Elec pf.	k 95	86½	97½
Amer. Elec. pwr., pf.	m110½	102½	111½
Amer. Gas & Elec., 6% pf.—no par.	k 93½	90½	95½
Amer. Gas & Elec., com.—no par.	k 84½	64	99½
Amer. Lt. & Trac., 6% pf.	106	105	115½
Amer. Lt. & Trac., com.	212	195	264
Amer. Pwr. & Lt., 6% pf.	k 93	92	96
Amer. Pwr. & Lt., com.—no par.	m 56½	50½	56½
Amer. Pub. Serv., 7% pf.	k 92	....	....
Amer. Pub. Serv., com.	47	45	80
Amer. Pub. Utilities, 6% pf.	k 85½	....	....
Amer. Pub. Utilities, 7% pf.	k 90	....	....
Amer. Pub. Utilities, com.	k 70	....	....
Amer. States Sec., A	k 31	....	....
Amer. States Sec. B	k 21	....	....
Amer. Superpwr., pf.—25	k 24½	22½	26½
Amer. Superpower, pf.	91½	90	94
Amer. Superpwr., Class A—no par.	k 25	19½	37½
Amer. Superpwr., Class B—no par.	k 26½	21½	39
Amer. Wtr. Wks. & Elec., 7% pf.	105	101½	108½
Amer. Wtr. Wks. & Elec., com.—20.	k 54½	43½	74
Anaconda Copper	k 47½	41½	51
Appalachian Pwr., 7% pf.	100	99	101
Appalachian Pwr., 1st pf., 7%	100	99	102
Appalachian Pwr., com.	80	80	83
Arizona Pwr., 7% pf.	k 75	....	....
Arizona Pwr., com	m 27	27	35½
Arkansas Cent. Pwr., pf., $7—no par	k104½	....	....
Arkansas Lt. & Pwr., 7% pf.	k 98	....	....
Arkansas Lt. & Pwr., com.	100	110	115
Asheville Pwr. & Lt., 7% pf., ex.div.	l104½	100½	106
Assoc. G.&E., pf.—$3.50—50	k 50	....	....
Assoc. Gas & Elec., pf.—$6—no par	k 91	....	....
Assoc. Gas & Elec., Class A—no par	k 30½	25½	35½
BABCOCK & WILCOX, com.	k122	114	149
Binghamton Lt., Ht. & Pwr., pf.	105	105	110
Birmingham Elec. pf.—$7—no par	k104½	....	....
Blackstone Valley Gas & Elec., pf.	103	103	106
Blackstone Valley G.&E., com.—50.	98	....	....
Blaw-Knox, com	l 51	45	56
Brazilian Trac., Lt. & Pwr., com.	f 97	....	....
Broad River Pwr., pf.	k 93½	....	....
Brooklyn Edison, com.	k142½	133	146½
Buffalo, Niagara & East. Pwr., pf.—25	k 24½	....	....
Buffalo, Niagara & Eastern Pwr., com.—no par	k 27	....	....
CALIFORNIA ELEC. GENERATING, pf.	93	89	95
California Ry. & Pwr., pf.	105	88	115
Carolina Pwr. & Lt., pf.—$7—no par	k104½	....	....
Cent. & S. W. Ut. 7% pf.—no par	a 92	89½	95
Cent. & S. W. Ut., pr. in pf.—no par	a 94	93	100
Central Ariz. Lt. & Pwr., pf.	k 98	....	....
Central Ark. Ry. & Lt., 7% pf.	k 98	....	....
Central Ill. Pub. Serv., 6% pf.	k 89	....	....
Central Ind. Pwr., 7% pf.	86	87	93½
Central Pwr. & Lt., pf.	k 96	....	....
Central States Elec., 7% pf.	k 91	....	....
Central States Elec., com.	m200	200	230
Century Elec., com.	m115	110	116
Chicago Fuse Mfg., com., no par.	a 32	30½	35
Cincinnati Gas & Elec., com.	g 90½	....	....
Cities Service, 6% pf.	86½	82½	86½
Cities Service, pf. B—10.	7½	7½	7½
Cities Service, pf. BB—100	m 75	....	....
Cities Service, com.—20.	41½	37½	42½
Cities Service, Bks. Shrs.—10.	20½	19	20½
Clarion River Pwr., pf.	93	93	95
Cleveland Elec. Illg., 6% pf.	k107	....	....
Cleveland Elec., Illg., com.	k290	....	....
Colorado Pwr., 7% pf.	k 95	....	....
Columbia Gas & Elec., 7% pf.	k113	112	115
Columbia Gas & E., com.—no par.	k 81½	63½	90
Columbia Ry., Gas & Elec., 6% pf.	90	65	96
Columbus Elec. & Pwr., 2d pf.	k103	....	....
Columbus Elec. & Pwr., com.	k250	....	....
Columbus Ry., Pwr. & Lt., 1st. pf.	k 98	....	....
Columbus Ry., Pwr. & Lt., pf. B.	k 94	....	....
Col. Ry., Pwr. & Lt., com.—no par.	k 85	....	....
Commonwealth Edison, com.	a141	137½	144
Commonwealth Pwr., 6% pf.	k 85½	....	....
Commonwealth Pwr., com—no par.	k 36½	28½	42½
Conn. Lt. & Pwr., 8% pf.	116	117	121
Conn. Lt. & Pwr., 7% pf.	107	108	113
Cons. Gas of N. Y., pf.—50.	k 58	....	....
Cons. Gas of N.Y., com.—no par.	k 96½	87	104½
Cons. Gas Elec. Lt. & Pwr. of Balti., 6% pf.	e105	102	105
Cons. Gas, Elec. Lt. & Pwr. of Balti 6½% pf	e111	108½	111
Cons. Gas, Elec. Lt. & Pwr. of Balti. 7% pf.	e113½	109	113½
Cons. Gas, Elec. Lt. & Pwr. of Balti. 8% pf.	e126½	124	128½
Cons. Gas, Elec. Lt. & Pwr. of Balti. com.—no par	e 52	45	57½
Cons. Pwr. & Lt., 7% pf.	k105	....	....
Consumers Pwr., 6% pf.	k 97	....	....
Consumers Pwr., 6.6% pf.	k101½	....	....
Continental Gas & Elec., 7% pfc. pf	k 97	....	....
Continental Gas & Elec., 7% pr pf.	k 95	....	....
Continental G.&E., com.—no par.	k130	....	....
Crocker Wheeler, com.	k 18	....	....
Crocker Wheeler, pf.	k 55	....	....
DALLAS PWR. & LT., 7% pf.	k105	....	....
Dayton Pwr. & Lt., 6% pf.	k100	....	....
Detroit Edison, com.	k135½	123½	141½
Dubilier Condenser & Radio, com. no par	k 6½	4½	11
Dubuque Elec., 6% pf.	94	93	98½
Duquesne Lt., 7% pf.	112½	111½	113
EAST. N. Y. UTIL. pf.	80	80	85
Eastern New York Util., com.	65	70	75
Eastern States Power	k 14	....	....
Eastern States Pwr., pf	k 87	....	....
Eastern Tex. Elec., 7% pf.	k103	....	....
East. Tex. Elec., com.—no par.	75	70	80
Edison Elec. Illum. of Boston, com.	d227	207	250
E. Paso Elec., com.—no par	70	70	94
E. Paso Elec. pf.	k103	....	....
Elec. Bond & Share, 6% pf.	l107	103½	107½
E. Bd. & Share Sec., com.—no par.	l 68½	56½	86
El. Household Util.	a 13	13	25
Elec. Investors, 6% pf.—no par.	k 89½	....	....
Elec. Investors, com.—no par.	k 40	30½	74½
Elec. Investors, 10% pd. receipts.	18	12	56
Elec. Pwr. & Lt., ctfs., pf.	k 94½	89½	97½
Elec. Pwr. & Lt., ctfs., 40% pd.	102½	99½	115
Elec. Pwr. & Lt., ctfs. full pd.	105	103	110½
Elec. Pwr. & Lt., ctfs., com.—no par	k 20	15½	34½
Elec. Ry. Securities, com.—no par.	m6	4½	10
Elec. Refrig.	k 75	62½	75
Elec. Storage Battery, com.—no par.	k 80½	71½	80½
Elmira Wtr., Lt. & R. R., 7% pf.	98	97½	99½
Emerson Elec. pf.	m103	100	104½
Empire Dist. Elec., 6% pf.	80	80	85
Empire Pwr., A	k 24½	....	....
Eng. Pub. Serv., pf.—no par	k104½	97	104½
Engr. Pub. Serv., com.—no par.	k 22½	21	29½
Eureka Vac. Cleaner, com.—no par.	k 48	43	53½
FAIRBANKS MORSE, com—no par	49	46	59½
Fairbanks Morse, pf.	113	108½	115
Federal Lt. & Trac., com.	k 31½	28	39½
Federal Light & Traction, pf.	86½	87	89
Federal Utilities, pf.	k 70	....	....
Federal Utilities, com.	k 17	....	....
Ft. Worth Pwr. & Lt., 7% pf.	l107½	105	108
GALVESTON-HOUSTON ELEC., 6% pf.	k 42	....	....
Galveston-Hstn El., com.	k 12	....	....
Gen Elec , new	k 82½	79	82½
Gen. Elec., com.	k329	285	386½
Gen. Elec., special—10.	k 11½	11	11½
Gen. G.&E., (Del.) com. A no par.	k 40½	34	59
Gen. G.&E., (Del.) com. B no par.	k 33	28	45½
Gen. G.&E., (Del.) A pf. $8—no par	109	105½	110½
Gen. G.&E., (Del.) A pf. $7—no par	97	95	99½
Gen. G.&E., (Del.) B pf.	93½	92½	96
General Public Service, pf.	104½	90	106½
General Public Service, com.	k 13	12½	16½
Ga. Lt., Pwr & Rys., 6% pf.	86	82	86½
Ga. Lt., Pwr. & Rys., com.	m 57½	56½	73½
Ga. Ry. & Pwr., 8% pf.	k111	....	....
Ga. Ry. & Pwr., 7% pf.	k101	....	....
Ga. Ry. & Pwr., 4% pf.	k130	....	....
Ga. Ry. & Pwr., com.	k115	....	....
Gt. Western Pwr., 7% pf.	k102	....	....
HAVANA ELEC. UTIL., com.	38½	37½	44½
Havana Elec. Util., pf.	m 75	64½	75
IDAHO PWR., 7% pf.	103½	103	104
Ill. No. Utilities, 6% pf.	a 91	90	92
Ill. Pwr. & Lt., 7% pf.	k 97½	....	....
Ingersoll Rand.	92	80½	104
Int. Combus. Engr., com.—no par.	k 54½	33½	64½
Int. Utilities, class A—no par.	m 31	31	39
Int. Utilities, class B—no par.	k 5½	4½	9½
Interstate Pwr., pf., $7 no par.	k 93	....	....
Interstate Pub. Serv., 7% pf.	96½	96½	98
Iowa Ry. & Lt., 7% pf.	95	98	100
JERSEY CENTRAL PWR. & LT. 7% pf.	k 94	95	97½
Jersey Central Pwr. & Lt., pfc. pf.	95½	95½	96½
Jersey Central Pwr. & Lt., com.—no par	45	45	50
Johns-Manville, com.—no par.	k138	....	....

*Quotations on bonds will be published in the first issue of each month only.
Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid, low, high. lBid, low, high, Tuesday, June 15. mBid, low, high, Wednesday, June 16. mLatest quotations available. n1925.

Stock Quotations of Electric Light and Power and Manufacturing Companies (Continued)

(Prices on New York stock market unless otherwise noted. Unless otherwise noted the par, stated, or preference value of stock is $100.)

Companies	Bid Price Saturday June 12	Low 1926	High 1926
KANSAS CITY PWR. & LT., pf.	112	107¼	112
Kansas Gas & Elec., 7% pf., ex. div.	f101	99	102
Kentucky Hydro-Elec., pf.	a 93½	91½	95
Kentucky Sec., 6% pf.	78	75	79
Kentucky Sec., com.	k100	....	....
Kentucky Utilities, 6% pf.	92½	90	95
Keystone Pwr. & Lt., 7% pf.	95	95	97
Kings County Ltg., 7% pf.	k103	....	....
Kings County Ltg., 8% pf.	103	105	108
LACLEDE GAS LT., com.	155	146	168
Lehigh Pwr. Sec., com.—no par.	k 15¼	10	23
Long Island Ltg., 7% pf.	k108	....	....
Long Island Ltg., com.—no par.	115	120	150
Los Angeles Gas & Elec., 6% pf.	k 96	....	....
Louisville Gas & Elec., Class. A	k 23½	22¼	26¼
MANHATTAN ELEC. SUPPLY.	k 75½	56	78
Manila Elec., com.—no par.	38	27½	39½
Maytag Mfg., com.	k 21	19	23¼
Memphis Pwr. & Lt., pf., $7, no par	105	103	107
Metro. Edison, pf.—$6—no par.	k 94½	....	....
Metropolitan Edison, pf., $7, no par.	k103	....	....
Metropolitan Edison, com., no par.	45	45	50
Middle West Utilities, 7% pf.	a100¾	97½	111½
Middle West Utilities, 7% pr. lien pf.	a116½	106½	123½
Middle West Utilities, com.—no par.	a114½	108	134½
Midland Utilities, pr. ln. pf.	a 99	98	100
Midland Utilities pf. A	a 98½	96	98
Milwaukee Elec. Ry. & Lt., 7% pf.	100	....	....
Milwaukee Elec. Ry. & Lt., 6% pf.	91	....	....
Minn. Pwr. & Lt., 7% pf.	f102½	100	103½
Miss. Pwr. & Lt., pf.	k101	....	....
Miss. River Pwr., 6% pf.	k 93½	....	....
Miss. River Pwr., com.	k 60	....	....
Mohawk Hudson Pwr., 1st pf.—$7—no par.	k101	....	....
Mohawk Hudson Pwr., 2nd pf.—$7—no par.	k 94	....	....
Mohawk Hudson Pwr., com.—no par	k 24	20½	28½
Montana Pwr., pf.	m114½	112½	119½
Montana Pwr., com.	k 77	69½	83½
Montreal Pwr., com.	f 229½	....	....
Mountain States Pwr., pf.	k 96	....	....
Mountain States Pwr., com.	k 20	....	....
NASSAU & SUFFOLK, LTG., pf.	k 97½	....	....
National Carbon, pf.	m127¼	125	128
National Elec. Pwr., pf.	92	93	95
National Electric Pwr-A	a 21	19½	26
Nat.-Lt., Ht. & Pwr., com.—no par.	24	22	25
National Lt., Ht. & Pwr., 5% pf.	72	71	73
National Pwr. & Lt., pf., $7—no par.	k100½	96	102½
National Pwr. & Lt., com.—no par.	k 21½	16½	38¼
National Pub. Serv., 7% pf.	k 90	....	....
National Pub. Serv., pfc. pf.	k 97½	....	....
National Pub. Serv., A com.—no par	k 19	15½	24
National Pub. Serv., B com.—no par	k 12	10	17½
Nebraska Pwr., 7% pf.	f106	103	106½
Nevada-Calif. Elec., com.	m 27½	18½	44½
New Brunswick Pwr., pf.	35	30	40
New England Pub. Serv., pr. ln. pf.	97	98	99½
New England Pub. Serv., pf.	88	95½	97
N. J. Pwr. & Lt., 7% pf.	106	104	110
New Orleans Pub. Serv., 7% pf.	k101½	....	....
N.Y.& Queens Elec.Lt.& Pwr.,5% pf.	k 86	....	....
N. Y. Central Elec., 7% pf.	96	98	100
Newport News & Hampton Ry., Gas & Elec., com.	110	108	112
Newport News & Hampton Ry., Gas & Elec., pf.	110	109	114
Niagara Falls Pwr., 7% pf.—25.	k 28½	27½	28½
Niagara, Lock. & Ont. Pwr., 7% pf.	108	110	111½
Niagara, Lock. & Ont. Pwr., com.—no par	m 50	n 60	n 73
No. Amer., 6% pf.—50.	k 50	49	60½
No. Amer., com.—10.	k 52½	42	67
No. Amer. Edison pf.—no par.	k 96	91½	96½
No. Amer., Lt. & Pwr., pf.	101	88	104
No. American Utilities, pf., full pd.	m 94½	89	96
No. American Utilities, pf., 25% pd.	m 19	18	27
N.C. Pub. Serv., pf.—$7—no par.	k 89	....	....
Northeastern Pwr., com.	k 19½	17½	36½
No. Indiana Gas & Elec., pf. A.	98	98	100
No. N. Y. Utilities, 7% pf.	k102½	....	....
No. Ohio Pwr., com.—no par.	k 13½	11	26½
No. Ohio Trac. & Lt., 6% pf.	81	78	81
No. Ohio Trac. & Lt., 7% pf.	85	88	91
No. Ont. Lt. & Pwr., pf.	k 81	....	....
No. Ont. Lt. & Pwr., com.	k 70	....	....
No. States Pwr., 7% pf.	k102	....	....
No. States Pwr. com.	k107½	97	136½
No. Texas Elec., 6% pf.	k 41	....	....
No. Texas Elec., com.	k 18	....	....
OHIO BRASS, com. B—no par.	74	70	79
Ohio Brass, pf.	100	98	101
Ohio Gas & Elec., 7% pf.	92	92	95
Ohio Pwr., 6% pf.	95	93	95
Ohio Pub. Serv., 6% pf.	90	90	93
Ohio Pub. Serv., 7% pf.	k 98½	....	....
Ohio River Edison, pf.	k 98½	....	....
Oklahoma Gas & Elec., pf.	k 95	....	....
PACIFIC GAS & ELEC., 6% pf.	k 98	....	....
Pacific Gas & Elec. com.	k127½	118	132½
Pacific Pwr. & Lt., 7% pf.	f 99	98	101½
Parr Shoals Pwr., 6% pf.	92	....	....
Penn Central Lt. & Pwr., pf.—no par	c 72½	71	91
Penn-Ohio Edison, 7% pf.	k 94	....	....
Penn-Ohio Elec., 7% pf.	94	93	96
Penn-Ohio Pwr. & Lt., 7% pf.	96½	94	97
Penn-Ohio Pwr. & Lt., 8% pf.	107	100	106
Penn Pwr.&Lt.—$7—no par, ex.div.	f106	103	107½
Penn Pub. Serv., 7% pf.	101	96	100
Penn Pub. Serv., 6% pf.	85	85	90
Penn Wtr. & Pwr., com.	c147	141	171
Phila. Co., 6% pf.—50.	k 49½	47½	50½
Phila. Co., com.—50.	71	59½	76½
Phila. Elec., com.—25.	c 49½	41½	67½
Pittsburgh Utilities, pf.—10.	20	14½	20½
Portland Elec. Pwr., 7% pf.	k 98	....	....
Portland Elec. Pwr., 6% pf.	k 75	....	....
Portland Elec. Pwr., 6% 2d pf.	k 70	....	....
Portland Elec. Pwr., com.	k 34	....	....
Potomac Elec. Pwr., pf.	m106	....	....
Pwr. Corp. of N.Y., com—no par.	m 79	77½	90½
Pwr. Sec., pf.—no par.	k 15	....	....
Pwr. Sec., com.—no par.	k 4	....	....
Pub. Serv. of N. J., 7% pf.	k106	103½	108½
Pub. Serv. of N. J., 8% pf.	k119	115	120½
Pub. Serv. of N. J., com.—no par.	k 85½	72	92½
Pub. Serv. of No. Ill., 6% pf.	a104	100½	104
Public Serv. of No. Ill., 7% pf.	a114	112	116½
Pub. Serv. of No. Ill., com.—no par	a135½	129½	137
Pub. Serv. of No. Ill., com.	a136	129½	136
Pub. Serv. of Okla., 7% pf.	95	92	95
Pub. Serv. Elec. & Gas, 6% pf.	101	97	101½
Public Service Elec. Pwr., pf.	115	106	112
Puget Sound Pwr. & Lt., 7% pf.	k104	....	....
Puget Sound Pwr. & Lt., 6% pf.	k 83	....	....
Puget Sound Pwr. & Lt., com.	k 31½	28	66½
RADIO CORP. OF AM., pf.—50.	43½	44½	47½
Radio Corp. of Amer., com.—no par.	k 44½	32	46½
Republic Ry. & Lt., pf.	k105	....	....
Republic Ry. & Lt., com.	k 85	....	....
Rochester Gas & Elec., 5% pf.	95	80	98
Rochester Gas & Elec., 6% pf.	k101	....	....
Rochester Gas & Elec., 7% pf.	k105	....	....
SAN JOAQUIN LT. & PWR., 7% pf	97	97½	98½
St. Joseph Ry., Lt., Ht. & Pwr., pf.	65	60	65
Servel Corp., Class A.	k 22	15½	30½
Servel Corp., Class B—no par.	m 40	....	....
Sierra Pacific Elec., com.	k 25	....	....
Sioux City Gas & Elec., 7% pf.	k 97	....	....
S. E. Pwr. & Lt., pf.—$7—no par.	99½	97	100
Southeastern Pwr. & Lt., pfc. pf.	63	60	67½
S. E. Pwr. & Lt., com.—no par.	k28½	20	46½
So. Calif. Edison, 8% pf.	120	135	140
So. Calif. Edison, 7% pf.	109	110	112
So. Calif. Edison, 6% pf.	98	97½	99
So. Calif. Edison, com.	k 31	30½	32
Southern Cities Utilities, 7% pf.	k 85	....	....
Southern Cities Utilities, com.	k 46	....	....
Southwestern Lt. & Pwr., A.	k 60	....	....
Southwestern Lt. & Pwr., B.	k 45	....	....
Southwestern Lt. & Pwr., $6 pf.	k 81	....	....
Southwestern Pwr. & Lt., 7% pf.	k101	....	....
Springfield (Mo.) Ry. & Lt., 7% pf.	95	....	....
Standard Gas & Elec., 8% pf.	k 54½	53½	57½
Standard Gas & Elec., 7% pf.	k102½	....	....
Standard Gas & Elec., com —no par.	k 55	51	69
Standard Pwr. & Lt., 7% pf.	k 93	....	....
Staten Island Edison, pf.—$6—no par	k 95	....	....
Superheater, com.—no par.	k142	....	....
Syracuse Lighting, 7% pf.	102	105	107
Syracuse Lighting, 8% pf.	115	....	....
Syracuse Lighting, com.	300	260	315
TAMPA ELEC., com., new	k 48	....	....
Tenn. Elec. Pwr., 6% pf.	k 85	....	....
Tenn. Elec. Pwr., 7% pf.	k102	....	....
Terre Haute, Ind. & East Trac., pf.	20	23	37
Terre Haute, Ind. & East. Trac., com	3	3	5
Tex. Pwr. & Lt., 7% pf.	f105½	102	106
Tide Water Pwr., 8% pf.	k102½	....	....
Timken Roller Bearing, com—no par	k 51½	44½	56½
Toledo Edison, 8% pf.	113	112	114
Toledo Edison, 7% pf.	k102½	....	....
Toledo Edison, com.	100	....	....
Tri-City Ry. & Lt., 6% pf.	85	87½	89
UNITED GAS & ELEC., 6% pf.	k 96	....	....
United Gas & Elec., com.—no par.	m57	56	66
United Gas & Elec. (N.J.), 5% pf.	k 71	....	....
United Gas Impr.—50.	c108½	84½	144½
United Lt. & Pwr., pf.—$4—no par.	k 48	....	....
United L. & P. pf.—$6.50—no par.	85	81	91
United Lt. & Pwr., com. A.—no par.	k 15½	12½	28
United Lt. & Pwr., com., B—no par new	k 18½	15	31
Utah Pwr. & Lt., 7% pf.	f101½	99	103½
Utica Gas & Elec., 7% pf., ex. div.	k105	....	....
Utica Gas & Elec., com.	200	....	....
Utilities Pwr., & Lt., 7% pf.	k 92	....	....
Utilities Pwr. & Lt., com A.	m 33½	28½	37
Utilities Pwr. & Lt., com. B—no par.	k 15½	14	18½
VERMONT HYDRO - ELEC., 7% pf.	94	95	96
Virginia Elec. & Pwr., 7% pf.	103½	101	103½
Virginian Pwr., 7% pf.	108	102	104
Virginian Pwr., com.	70	....	....
WAGNER ELEC., pf.	b 68	65½	85
Wagner Elec., com.—no par.	m 22½	20	34½
Washington Ry. & Elec., com.	k170	....	....
Washington Ry. & Elec., pf.	k 89	....	....
Washington Wtr. Pwr., com.	130	130	134
West Mo. Pwr., 7% pf.	k 91	....	....
West Penn., 7% pf. temp. ctfs.	m100	95½	101
West Penn, com.	m125	118	130
West Penn Elec., pf.	99½	95½	100½
West Penn Elec., Class A	94	88½	97
West Penn Pwr., pf.	110	108	112
West Va. Lt., Ht. & Pwr., 7% pf.	95	95	98
West Va. Utilities, 7% pf.—50.	45½	43	46½
Western Pwr., 7% pf.	k 94	....	....
Western States Gas & Elec., 7% pf.	k 90	....	....
Western States Gas & Elec., com.	k 16	....	....
Westinghouse El. & Mfg., com—50.	k 69	65	79½
Weston Elec. Instrument, Class. A.	k 31	27½	31½
Weston Elec. Instrument, com.	k 16½	13½	19
Wheeling Elec., pf.	90	91	93½
Wis. Pwr., Lt. & Ht., 7% pf.	90	85	90
Worthington Pump, pf. A	70	68	80
Worthington Pump, pf. B	59	53	65
Worthington Pump, com.	k 33½	20½	44½
YADKIN RIVER PWR., 7% pf., ex. div.	f104½	102	106
Yale & Towne, com.—25.	k 66½	60½	69

Stock Exchange: aChicago; bSt. Louis; cPhiladelphia; dBoston; eBaltimore; fMontreal; gCincinnati; hSan Francisco; iPittsburgh; jWashington. kBid, low, high, Tuesday, June 15. lBid, low, high, Wednesday, June 16. mLatest quotations available. n1925.

of the business—and receive on the same in this separate special account only 3 per cent, the stockholders will suffer the loss of earning power in income thus shown.

But if the directors are compelled to keep it in a separate, non-useful bank account by adverse action of public authorities, then the consumer must suffer the loss of earning power in income thus inflicted upon the company.

So far as the company is concerned it would make no ultimate difference whether it be allowed to invest this $10 or this $100,000 at 10 per cent or be compelled by the commission to keep it in a hollow tree, except for the fact that in the first instance it gets its return upon this money property right along, and the attempt to get repaid to it the return of which it would in the other instance be unjustly deprived, through a readjustment of rates, involves as a practical matter a great many years of weary struggle.

Therefore, as a practical matter, in the interests of the present generation, which wants to get something back in the way of adequate return here, instead of hereafter, it is the duty of the company to contend against a proposition so fundamentally contrary to sound economics as has been advanced by the consulting engineer to this commission.

Company Reports

The following statements of earnings have been issued by electric light and power companies for the month of April:

Name of Company	Gross Earnings for April 1926	Gross Earnings for April 1925
Adirondack Power & Light*	$723,046	$640,478
Carolina Power & Light	629,753	555,487
Federal Light & Traction	540,074	475,195
Fort Worth Power & Light	234,958	225,124
Kansas Gas & Electric	372,246	504,405
Nebraska Power	363,109	339,489
Pacific Power & Light	315,729	283,974
Pennsylvania Power & Light	1,730,962	1,507,453
Southwestern Power & Light	1,197,850	1,052,198
Texas Power & Light	587,229	510,341
Utah Power & Light	823,670	748,158

*May.

Customer Sales Reach Total of $19,320,000 in April

Based upon monthly reports received by the ELECTRICAL WORLD from electric light and power companies selling stock direct to customers and employees, it is estimated that during April a total of 304,800 shares were sold in this manner. The total value of the stock sold is estimated at $19,320,000, or about $8,780,000 short of the sales reported in April last year. A total of 34,470 customers took part in the sales during April.

Public Service Electric & Gas Stock Authorized.—The Board of Public Utility Commissioners of the State of New Jersey has authorized the Public Service Electric & Gas Company to issue 2,500,000 shares of no-par-value common stock at $10 a share, reserving for future consideration the proposed issue of 150,000 shares of 6 per cent cumulative preferred stock.

Consumers Power's Strong Set-Up

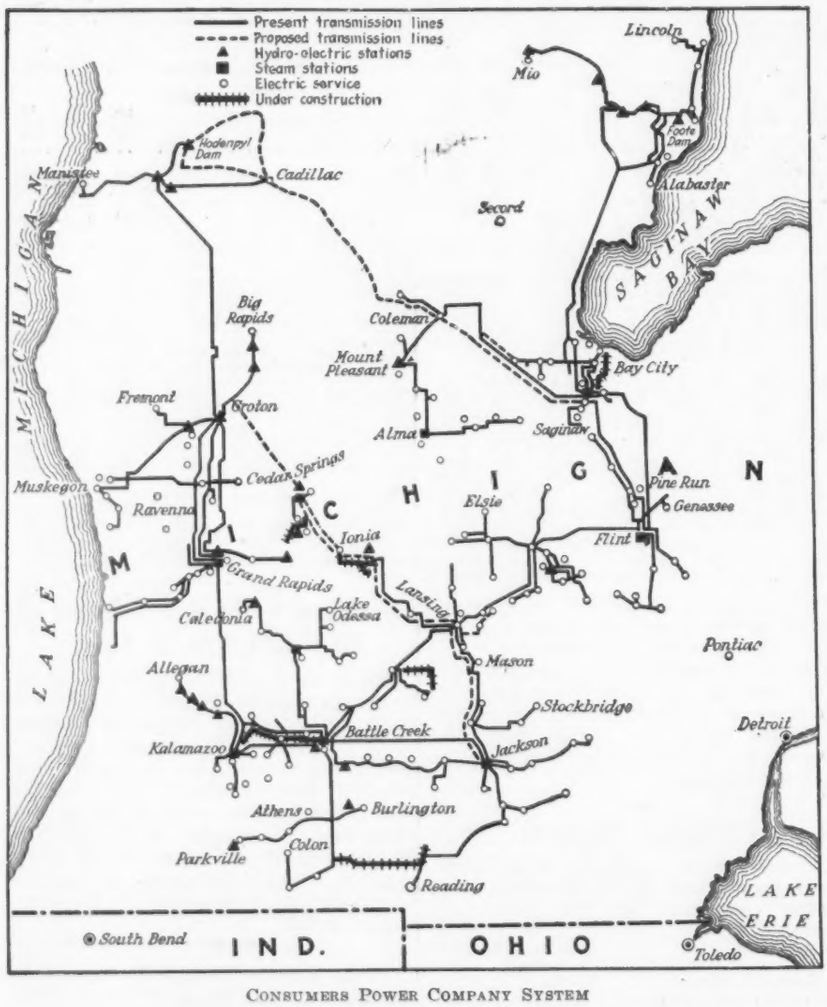
Program of Reforestation Is Expanded—Gross Earnings Have Doubled Within Six Years—Funded Debt Now Less than Total Stock Outstanding

BY PAUL WILLARD GARRETT
Financial Editor *New York Evening Post*

NOTWITHSTANDING noteworthy progress made in earnings during the last year, the Consumers Power Company is perhaps most proud of what it has done in reforestation. When the advantages of adequate protection for watersheds are considered, the program must be looked upon as a constructive step in the future development of the Consumers Power Company and the territory it serves.

In the annual report of the company, recently published, B. C. Cobb, its president, says: "Your company is carrying on the greatest conservation program, outside of the comprehensive work done by the state, ever undertaken in Michigan. During the year 1925 10,000 pine trees were planted at locations planted at various locations in the lakes formed by your company's dams. The future protection which reforestation will afford to the watersheds supplying your company's hydro-electric plants and the popular indorsement and commendation received have convinced your management that this work should be continued; therefore plans for 1926 include the planting of approximately 60,000 pine trees, 600,000 fish and additional game food, plants and seeds."

The significance of such a program lies in what it shows of the attention to matters that concern the distant future. Through just such a far-sighted policy the Consumers Power Company management has brought the organization to its present strong position.



CONSUMERS POWER COMPANY SYSTEM

near the northern water-power plants; also, in co-operation with state authorities, fish have been planted in various streams on which water-power plants are located and where the general public may find recreation. Wild rice and other pond plants upon which ducks and other wild fowl thrive have been

Gross earnings of the Consumers Power Company in 1925 totaled $20,684,973, no less than $15,608,348 of the aggregate representing revenue from the electric department. After deducting $9,141,528 for operating expenses and $1,996,330 for taxes, the gross income stood at $9,547,115. How wide was the margin of net earnings over interest charges may be seen from the fact that with $9,547,115 to draw upon the company had interest and amortization charges of only $2,485,547. After allowance for retirement reserve and dividends of $7,061,567, dividends on the preferred stock of $2,523,349 and provision for the retirement reserve of $1,392,327, the balance was shown as $3,245,890.

In the general balance sheet of the company the property, plant and equipment are carried at $110,053,733, which represents the greater part of the total assets of $125,971,761. On the liabilities side will be found $62,893,500 in various capital stock issues and $51,201,700 in funded debt held by the public. With the funded debt substantially smaller than the outstanding capital stock the financial structure of the Consumers Power organization is unusually strong.

Dividends Declared

The quarterly dividends listed below have been announced by electric light and power and electrical manufacturing companies:

Name of Company	Per Cent	When Payable
American Gas & Electric, com	.25	July 1
American Gas & Electric, com.*	....	July 1
American Gas & Electric, pf	$1.50	Aug. 2
American Power & Light, pf	$1.50	July 1
American Public Utilities, pte. pf	1¾	July 1
American Public Utilities, pr. pf	1¾	July 1
Associated Gas & Elec., class A†	....	Aug. 2
Bangor Hydro-Electric, pf	1¾	July 1
Binghamton Lt., Ht. & Pwr., pf	$1.50	July 1
Canadian General Electric, pf	1¾	July 1
Carolina Power & Light, pf	$1.75	July 1
Central Illinois Light, 6% pf	1½	July 1
Columbus Electric & Power, com	2½	July 1
Columbus Electric & Power, pf. B	1¾	July 1
Columbus Electric & Power, 2nd pf	1¾	July 1
Electric Bond & Share Securities, cap	.25	July 15
Electric Bond & Share, pf	1¾	Aug. 2
Electric Lt. & Pwr. of Abington & Rockland	.50	July 1
Electric Controller & Mfg., com	$1.25	July 1
Electric Controller & Mfg., pf	1¾	July 1
Electric Storage Battery, com. & pf	$1.25	July 1
Elmira Water, Light & R.R., 1st pf	1¾	June 30
Elmira Water, Light & R.R., 2nd pf	1¾	June 30
English Electric of Canada, pf	3½	June 30
Florida Public Service, pf	1¾	July 1
General Public Service $6 pf	$1.50	Aug. 2
General Public Service, conv., pf	$1.75	Aug. 2
Jersey Central Power & Light, pf	$1.75	July 1
Kansas Electric Power, pf	1¾	July 1
Kansas Gas & Electric, pf	1¾	July 1
Kentucky Securities, com	1½	July 1
Kentucky Securities, pf	1¾	July 15
Laurentide Power	1¾	July 15
Long Island Lighting, pf	1¾	July 1
Metropolitan Edison, $7 pf	$1.75	July 1
Metropolitan Edison, $6 pf	$1.50	July 1
Middle West Utilities, pf	1¾	July 15
Minnesota Power & Light, pf	1¾	July 1
Monon. West Penn P. S., pf	.43¾	July 1
Mountain States Power, pf	1¾	July 20
Narragansett Electric Ltg	$1	July 1
National Public Service, special	$1.75	July 1
New Jersey Power & Light, pte. pf	1¾	July 1
New York Central Electric, pf	1¾	July 1
Northeastern Power, cl. A	$1.50	July 1
Northern New York Utilities	.75	June 30
Northern Ohio Power & Light, 6% pf	1½	July 1
Northern States Power, com. A	$2	Aug. 2
Northern States Power, 7% pf	1¾	July 20
Northern States Power, 6% pf	1½	July 20
Northwest Utilities, pr. lien, pf	$1.75	July 1
Pacific Gas & Electric, com	2	July 15
Pittsburgh Transformer, pf	2	July 1
Pittsburgh Transformer, com	2	July 1
Portland Electric Power, 1st pf	1¾	July 1
Power Corp. of N. Y., com	.25	July 1
Public Service Elec. Pwr., pf	$1.75	Aug. 2
Savannah Elec. & Pwr., deb. A	2	July 1
Savannah Elec. & Pwr., deb. B	1¾	July 1
Shawinigan Water & Power	2	July 10
Toledo Edison, pr. pf	2	July 1
United Gas Impr.	$1	July 15
United Light & Power, pf. A	$1.62	July 1
United Light & Power, pf. B	$1.00	July 1
United Light & Power, com. A & B	.60	Aug. 2
United Lt. & Pwr., com. A & B (new)	.12	Aug. 2
Western States Gas & Elec., pf	1¾	July 15
Western Electric, com	$2.50	June 30
Weston Electrical Instrument, cl. A	.50	July 1

* Payable in no-par common stock.
† Payable either in cash or in class A stock at rate of one-fortieth share for each share held.

Manufacturing and Markets

Wages Stable, Trend Normal

Conference Board Finds Wage Fluctuations Since 1923 Confined Between Narrower Limits

ALTHOUGH the ten years ended with 1925 saw more violent wage fluctuations than had ever previously occurred in the history of the United States as far as available records show, present indications are that wages as a whole have become fairly well stabilized and have resumed their normal trend, according to the annual wage study of the National Industrial Conference Board, New York. The importance to industry and to business generally of more established wage conditions and of less severe fluctuations, according to the conference board, will be more fully appreciated if it is brought to mind that a 1 per cent increase in railroad wages, for instance, can add $28,000,000 a year to the cost of operating the country's railroads. As far as the immediate future is concerned, the board says, such wage changes as will occur are likely to be localized and sporadic, without greatly disturbing the general trend, which has been gradually upward since 1840, the earliest date for which detailed records are available.

Since 1923 there has been consistent evidence that wage fluctuations were being confined between narrower limits, in contrast with the period of 1915 to 1923, when the entire wage and price fabric was disrupted first by rapidly rising, then by sharply declining rates. One of the most significant events in the wage history of 1925 was that the outstanding wage controversy of the year, the anthracite-coal strike, resulted in the continuation of the existing wage scale. Since wages in the long run tend to follow commodity price movements, the price trend is scrutinized by the board in connection with its wage study, but with the result that as yet no definite long-time trend of the price level either upward or downward has been established. The average price level in 1925 is found to have been higher than for any other year since 1920 and 6 per cent higher than in 1924, but recently has been slowly declining.

1925	Average Weekly Earnings	Employment Index*
February	$27.12	78.9
May	27.02	79.4
August	26.37	78.1
November	27.13	81.7
February, 1926	27.28	85.5

* (Base June 1920 = 100)

While restriction of immigration during recent years has curtailed labor supply, this has been largely offset by the greater productivity due to more efficient management, greater use of power and technical improvement in productive methods. Production during the past decade, and particularly during 1925, has increased without requiring a commensurate increase in man power and at the close of 1925 was 42 per cent greater than at the lowest point in 1924, while during the same period employment increased only 16 per cent. This more intensive utilization of labor achieved during the past few years, the board points out, helps to sustain wage levels quite regardless of other influences because it reduces labor cost per unit of product. The accompanying table indicates the course of average weekly earnings in the 25 different industries covered by the board's study, as well as fluctuations in employment, during 1925, by quarter-years.

Federal Trade Commission Establishes New Division

The Federal Trade Commission has announced the establishment of a new division to be known as the Division of Trade Practice Conference. In this division will be co-ordinated and facilitated all work incidental to holding conferences with representatives of industries for the purpose of aiding such industries to adopt rules of business conduct looking to the elimination of harmful or unfair trade practices. The new division will be manned by trained employees already on the rolls. This division will take over the trade conference work which has been heretofore scattered among several divisions.

Census of Lighting Equipment

The total value of lighting equipment made in the United States during 1925 was $217,793,077, which compares with $205,866,358 in 1924 and $180,926,265 in 1923, according to the returns received from 797 establishments in the annual census of lighting equipment conducted by the Department of Commerce. The total value of the different types of fixtures is apportioned thus:

Residence	$59,894,558
Commercial	11,509,645
Industrial	5,766,714
Street-lighting	7,212,688
Marine lighting	410,696
Shades	16,384,467
Globes, bowls, chimneys and other illuminating glassware	9,242,694
Reflectors—metal, glass or porcelain	3,908,927
Miscellaneous	101,075,285
All other lighting fixtures and accessories	2,387,403
Total	$217,793,077

Non-Metallic Sheath Cable Rules Returned

American Engineering Standards Committee Allows N.E.C. Rule 507 for Tentative Field Application but Calls for Closer Agreement—Manufacturers' Association Appeals

THE American Engineering Standards Committee has referred back to the electrical committee of the National Fire Protection Association the proposed Rule 507 of the National Electrical Code, governing the use of non-metallic sheath cable, in hope that a more general agreement between majority and minority interests may be obtained. The proposed rules were allowed as tentative for field application. This adds a further chapter to the three years of controversy that has followed the application made by the Rome Wire Company to the "committee on new developments" of the N.F.P.A. electrical committee for admission of its new product "Romex." The article 5 committee of the N.F.P.A., to which the product was referred, was widely divided in opinion. The majority favored very restrictive rules requiring the use of insulators whenever non-metallic sheath cable came in contact with the building and allowed its use in one-family or two-family houses only. The minority demanded unrestricted use of the material except in conditions of dampness or other special hazard. The electrical committee in presenting its recommendations to the N.F.P.A. reversed the action of its sub-committee and advocated the virtually unrestricted use of the material. These recommendations were approved by the N.F.P.A. at its recent Atlantic City convention, as reported in the May 22 issue of the ELECTRICAL WORLD, and submitted to the American Engineering Standards Committee for approval for publication in the code as an American standard.

A.E.S.C. PROCEDURE

Under A.E.S.C. procedure this application came first before a special committee which met in New York on June 9 under the chairmanship of A. W. Whitney. The following members were present: A. R. Small, W. F. Steffins, V. H. Tousley, L. W. Davis, Alexander Maxwell, Ira H. Woolson, E. S. Crittenden and R. W. E. Moore. J. C. Forsythe, C. W. Abbot and P. G. Agnew attended by invitation. There was presented at this meeting the following communication from the Associated Manufacturers of Electrical Supplies:

"The board of governors of the Associated Manufacturers of Electrical Supplies feels deep concern over the effects which appear certain to result from the operation of Section 507 of the National Electrical Code governing the use of the new non-metallic sheath cable, now before the American Engineering Standards Committee for approval. The Electrical Manufacturers' Council and this association have been working persistently for years to

strengthen the prestige and influence of this code and to establish it as the universal standard for electrical construction. Through the development and promotion of the model uniform electrical ordinance we are endeavoring to overcome the lack of uniformity in local inspection practice under this code and are working steadily toward the day when municipal, insurance and other authorities will all accept this code as an American standard and refrain from purely local interpretations and local restrictions. The elimination of this inspection inconsistency will bring a great economic benefit to the American people. Your own committee is dedicated to the same principle.

"Rule 507, now before the A.E.S.C., has been the subject of a long controversy in the electrical industry. After three years it was adopted by a bare two-thirds vote of the electrical committee of the National Fire Protection Association, 26 votes for it and 13 against it. Without any reference to the arguments in the case, with which we are not concerned and on which we have no opinion, we desire to submit to you the fact that the approval of this section by the A.E.S.C. and its inclusion in the code will apparently be followed by the enactment of protective restrictions in many cities on the part of the inspection authorities. There is strong objection on the part of electrical inspectors to the admission of this new class of material without definite limitation of its use. Therefore, we face the prospect of a most unfortunate setback in the development of inspection uniformity under this code and one which the board believes will strike a serious blow to both the integrity and prestige of the National Electrical Code itself.

A Suggested Compromise

"The board believes that the American Engineering Standards Committee should have in mind this aspect of the case when Section 507 comes before it for consideration and should welcome any possible opportunity to avoid such a reaction in the progress of standardization in electrical construction practice. It is with the idea of safeguarding this principle that the board makes this statement and not for the purpose of reopening a technical controversy. It is believed that were the A.E.S.C. to refer this Section 507 back to the electrical committee with the expressed hope of avoiding the publication of rules which will lead to local retaliation in the form of restrictive ordinances in defiance of the code, a possible compromise might be arrived at between the majority and minority members of the committee that would be entirely acceptable to the inspection authorities. In fact, the board has been informed that such a suggested compromise has already been filed with the electrical committee as a basis for revision of these rules in the event that they should be approved by the A.E.S.C. and published in the code.

The committee after a protracted meeting passed this resolution by unanimous action:

> The special committee believes that the action of the sectional committee was taken by a substantial majority and appeared to represent the best conclusion attainable at the time and under the conditions obtaining in this field.
>
> In the hope, however, that a closer approach to unanimity may be obtained, it is recommended that the A.E.S.C. refer the code back to the sponsor with the request that an attempt be made to secure a more general agreement, and that this reference be made without prejudice to further consideration of the present form of the report by the A.E.S.C. at its September meeting in case a greater degree of unanimity is not secured in the meantime.
>
> It is further recommended that the A.E.S.C. agree that in the meantime the sponsor may on his own responsibility issue the present form as a tentative version for field application, but subject to further consideration and possible revision.
>
> Your committee believes that the personnel of the sectional committee was representative and adequate, and that the action of the sectional committee and of the sponsor was entirely regular.

On June 10 the main committee of the A.E.S.C. unanimously passed this recommendation of the special committee. When the balloting was over Mr. Small, chairman of the N.F.P.A. electrical committee, asked for instruction from the A.E.S.C. as to what constituted "unanimity of opinion." The chair replied that he did not believe the A.E.S.C. could give a precise definition, but that it had been the policy of the A.E.S.C. never to pass anything in which the major interest was in opposition.

The suggested compromise rules referred to in the communication from the Associated Manufacturers of Electrical Supplies were the product of an interested observer in the industry and had been offered to various interests concerned in the situation prior to the N.F.P.A. convention, but without complete acceptance. Following this meeting these compromise rules were formally filed with the electrical committee by Laurence W. Davis, secretary of the Association of Electragists International, with the following letter:

"Acting for the Association of Electragists International, I beg to submit to the electrical committee of the National Fire Protection Association for its consideration the attached draft of proposed rules covering non-metallic sheathed cables for revision of the present National Electrical Code rules. These rules are submitted for the early consideration of the electrical committee through its proper article committee in the belief that they hold a more reasonable restriction as to the conditions under which this new wiring method may be employed, which may bring together the present widely conflicting viewpoints toward this new wiring method without setting up any restrictions affecting the cost of installation which would impede a broad and fair trial in the field for which it is best fitted.

Rules Should Have Wide Approval

"It is evident that the adoption of any National Electrical Code rules which do not have the widest possible approval of all inspectors, contractors and other groups inevitably leads to the establishment of special local rulings in conflict with the code and tends to destroy the integrity of the code as an American standard. It is our hope that the proposed rules submitted herewith to the electrical committee limiting the use of this wiring method to light and appliance branch circuits in residence occupancies, and permitting its use in exposed wiring work as well as concealed wiring work, when protected in exposed work within 5 ft. of floor by wood or metal protecting strips and in no place run along the wall nearer than 6 in. above the floor, will provide a common ground for approval upon which all groups may be harmonized to give this wiring method a fair trial under broad usage.

"So radical a change in the standards maintained for years by the National Electrical Code as is represented in this new wiring method, if it is to hold the confidence and support of all users of the code, should require a cautious and reasonably restricted use of such new methods until its elements of field hazards may be determined, and we submit these proposed rules covering non-metallic sheathed cable in the belief that they will provide a broad trial with necessary caution in the determining of its field hazards, and will lead to such intelligent revisions of the code later on as may seem to be wise. We request that these proposed rules for use on non-metallic sheathed cable be submitted to the proper article committee for its earliest consideration."

Proposed Compromise Rules

The proposed rules suggested as a possible basis of compromise read as follows, the italicized portions being quoted directly from present majority rules:

(a) Shall not be used except for light and appliance branch circuits not exceeding 300 volts between conductors.

(b) Shall be of approved *types and of 2 or 3 conductor assemblies in sizes No. 14 to 8, inclusive.*

(c) Shall be used only in residence occupancies.

(d) May be used *where in exposed wiring work* under the following conditions:

(1) *Shall be mounted directly upon surfaces of woodwork, plaster, cement, brick or other building finish.*

(2) *Shall be secured between outlets with approved fastenings spaced at intervals not exceeding 4 ft.*

(3) *Shall be used only in dry places* and in no place run along the wall nearer than 6 in. above the floor.

(4) Shall be protected within 5 ft. of floor by wood or metal protecting strip placed over the cable and securely fastened in place.

(e) May be used where in concealed wiring work under the following conditions:

(1) Shall be used only in dry places; in wood joist or stud partitions, floors and walls.

(2) Shall be fished in continuous lengths from outlet to outlet.

(3) The new work should be left free of supports so that it may be withdrawn for inspection.

(f) Shall be run without joints, splices or taps from outlet box to outlet box (or junction boxes or plates).

(g) Shall be provided with approved outlet (or junction boxes at each outlet), into which the cable shall be run and to which it shall be rigidly *fastened* by means of approved *fittings.*

It is recommended that for all side wall and partition outlets in concealed work in new buildings under construction outlet boxes having a depth of approximately 1½ in. be used. If cable enters boxes from side in concealed work, boxes of such depth are required.

(h) All bends shall be so made and other handling shall be such that the non-metallic covering of the cable will not be injured.

(i) *Shall not be buried in plaster, cement or similar finish.*

(j) When non-metallic sheathed cable is installed in conduit the provisions of Section 503 of this article shall apply as far as practicable.

(k) *When in exposed or in concealed wiring, non-metallic sheathed cable is run through holes in studs, joists or similar wood members, the holes shall be located at the approximate center of studs and not less than 2 in. from the nearest edge of joists or other members whose depth permits this spacing.*

(l) *In attics and accessible roof spaces cable shall be considered exposed to mechanical injury if run on upper edge of joists and shall be protected* by suitable wood or metal strips laid over the cable and securely fastened in place.

Construction Work Continues at High Rate

Volume of Contracts Consistently Higher Than for Same Period Last Year —Trend Upward

CONTRACTS awarded on engineering construction projects throughout the United States amounted to $241,337,000 during May as compared with $199,307,000 for the same month months in 1925. Compared with May, 1925, last month's lettings gained 21 per cent in buildings and 22 per cent in construction other than buildings. Proposed work for the same periods showed gains in total buildings and construction other than buildings. A drop of 4 per cent, however, occurred in the commercial and public building group.

The volume of construction work this year has been consistently higher than for the same period last year. The index number for the month of May is last year, according to the *Engineering News-Record*. The minimum value per project adopted in each class was as follows: Water works and excavation, $15,000; other public projects, $25,000; industrial buildings, $40,000; commercial, public and other buildings, $150,000. Work definitely reported as proposed, at the minimum mentioned for each class, amounted to $367,745,000 for the month just closed as compared with $330,814,000 for May, 1925.

A comparison of cumulative totals reveals the fact that contracts awarded Jan. 1 to June 1, 1926, totaled $1,122,382,000, as against $934,888,000 for the corresponding period last year. Proposed work Jan. 1 to June 1, 1926, reached a total of $2,578,157,000, compared with $2,140,157,000 for the same 254, and that for the whole of 1925 is 201, as against 100 for 1913. This means that the actual volume of construction during May (not the mere money value of the contracts let that year) is 154 per cent above the volume of construction for the same month in 1913. If at least one of the seven remaining months in this year does not pass the high mark set by August, 1925, then it can be said that the peak of the construction boom has been reached and passed. It is expected, however, that the 1926 curve of construction volume will cross that of 1925 some time between now and Dec. 31 and travel along beneath the latter for the remainder of the current year. The grand total for 1926 will probably come very close to that of the record year 1925.

VALUE OF CONTRACTS LET IN THE UNITED STATES AND CANADA, MAY, 1926

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States	Jan. 1 to Date, U. S.	Canada
Water works	$373,000	$693,000	$221,000	$1,229,000	$476,000	$104,000	$3,096,000	$25,932,000	$138,000
Sewers	263,000	5,436,000	664,000	5,723,000	355,000	577,000	13,018,000	39,046,000	187,000
Bridges	2,788,000	160,000	827,000	1,721,000	707,000	601,000	6,804,000	27,246,000	30,000
Excavation, drainage, irrigation	.....	596,000	643,000	49,000	.....	498,000	1,786,000	10,074,000	765,000
Streets and roads	2,506,000	9,067,000	9,218,000	11,356,000	8,441,000	6,473,000	47,061,00	159,714,000	817,000
Industrial buildings	2,233,000	3,635,000	2,480,000	4,308,000	9,188,000	464,000	22,308,000	156,814,000	2,825,000
Commercial buildings	14,266,000	37,673,000	10,348,000	26,233,000	15,666,000	11,059,000	115,245,000	581,208,000	600,000
Federal government	57,000	2,965,000	1,085,000	26,000	335,000	.....	4,468,000	20,648,000	.....
Unclassified	170,000	8,392,000	9,459,000	1,974,000	5,042,000	2,514,000	27,551,000	101,700,000	7,487,000
May, 1926	$22,656,000	$68,617,000	$34,945,000	$52,619,000	$40,210,000	$22,290,000	$241,337,000	$1,122,382,000	$12,849,000
April, 1926	27,471,000	73,176,000	24,745,000	66,349,000	48,169,000	40,136,000	280,046,000	.....	16,684,000
May, 1925	16,918,000	76,417,000	13,619,000	33,012,000	39,230,000	20,111,000	199,307,000	.....	12,082,000
Jan. 1 to date, 1926	78,939,000	375,763,000	142,138,000	243,857,000	159,018,000	122,673,000	1,122,382,000	.....	52,487,000
Jan. 1 to date, 1925	79,648,000	330,004,000	73,088,000	166,674,000	165,997,000	119,469,000	934,880,000	.....	31,959,000

Business Conditions

INDUSTRIAL plants and central-station companies are both active buyers in the market and sales are ahead of last year to date, according to leading manufacturers. Negotiations under way and inquiries being received by electrical firms show no indication of a decrease in demand. A single central-station order that will amount to more than $1,500,000 is pending and will be placed in a few days. Other important contracts let covered $250,000 worth of steel-mill electrical equipment and $250,000 worth of generating equipment for a Pacific Coast central-station company.

Gradual business recession is predicted by Col. Leonard P. Ayres in the current issue of the *Bulletin* of the Cleveland Trust Company. He says: "The general situation can be summarized by noting that while the volume of business transacted in 1926 will without doubt be of very large proportions, it is probable that the months to come will produce smaller profits in most industries than the months that are past. No sudden or severe decline is threatened, but a genuine recession of trade and industry appears to have begun, and it seems probable that it will continue through 1926 and into 1927. The United States Steel Corporation reported a decline of 218,726 tons in forward orders for May, with incoming business for that month estimated at nearly 300,000 tons better than in April.

In New England small-motor sales were the principal item of trade, and they marked a definite reaction against the recession in buying which was noted in the district during the past few weeks. Negotiations are also pending for equipment for industrial plants, one project requiring about $250,000 worth of apparatus for a rolling mill. Several inquiries cover the electrification of paper mills. Central-station companies are steady buyers in the New York district, and one company is expected to place an order in a few days for a very large turbo-generator unit. Industrial plants continue to be active buyers. In the Southeast business is generally good with no outstanding sales. Excellent orders for motors have been received from the New Orleans territory, and purchases of construction materials have been particularly gratifying in the New Orleans, Birmingham, Atlanta and Savannah districts. In the St. Louis district sales are holding up to a high level, and several interesting inquiries have been received. An order for nearly $250,000 worth of steel-mill electrical equipment was just placed in that district. The outlook is promising in the Middle West and utility companies are actively engaged in construction work. On the Pacific Coast several orders were placed for apparatus. A central-station company purchased about $250,000 worth of generating equipment for a project on the Elwha River, Clallam County, Washington, and several scattering motor sales were consummated.

Non-Ferrous Metal Market Active —All Prices Strengthen

Lead has been perhaps the strongest of all the non-ferrous metals in an active market, and the contract prices for that metal were advanced four times by the leading New York seller. Buyers of copper, zinc and tin do not seem quite so insistent or so anxious to book forward orders as are those of lead.

Consumers of lead who could not be interested a few weeks ago in 100 tons of lead at 7.65 cents are now anxious to buy several hundred tons at 8¼ cents. Producers, on the other hand, are pretty well sold for June and July and are not inclined to place business for deliveries beyond that except on an "average" price basis. Business has been active all week, and the American Smelting & Refining Company increased its official contract price on four separate occasions, finally reaching 8¼ cents on Wednesday. The price of tin has improved during the week, though business on the part of consumers has been small. Galvanizers have again bought zinc in satisfactory quantities, though reporting but little improvement in their business, and the price has moved upward.

NEW YORK METAL MARKET PRICES

	June 9, 1926 Cents per Pound	June 16, 1926 Cents per Pound
Copper, electrolytic	13.90	14.025
Lead, Am. S. & R. price	7.65	8¼
Antimony	10½	10½
Nickel, ingot	35	35
Zinc spots	7.425—7.45	7.525
Tin, Straits	59½	61
Aluminum, 99 per cent.	28	28

Base copper price June 16, 1926, 16 cents.

Small Motor Sales Principal Item in New England Trade

Definite reaction against the recession in buying which has marked the trade in the New England district for the past few weeks is evidenced in the report of a strong demand for small motors. A prominent manufacturer records sales for the past week far in excess of those of any week to date this year. Orders placed amounted to over $75,000 and consisted of a number of large lot sales. Another company reports that small-motor sales stand out alone as the principal source of steadiness in what would otherwise be a lagging market. The demand from large industrial units is less active, though negotiations pending include a number of interesting projects, of which electrical equipment for a Massachusetts rolling mill amounting to about $250,000 is notable, and several inquiries for installation of electrical drive in northern New England paper mills are of interest.

Central-station supply sales are quiet, but line materials were in demand owing to a number of repeat orders and small distribution extension work. One company closed a contract for 120,000 lb. of wire for eastern Maine projects, and another reports a good volume of line hardware for similar points where construction is well under way and which in the aggregate accounted for about $20,000 worth of supplies. Industrial electric truck sales are better than those last year, according to one manufacturer, who reports a number of recent sales together with a fair demand for replacements and parts. Several street-lighting projects are under consideration by Massachusetts cities. New construction supplies are moving slowly, though wiring contractors for the most part are marking time. Outlying residential work continues to expand favorably where wiring and fixture installations are carried along on the monthly payment plan. Household appliance sales show a falling off according to reports submitted by a group of central-station companies. Exceptions are noted, however, in the continued steady demand for the major appliances.

Central Stations Steady Buyers in New York District

Very satisfactory orders for diversified materials are reported from public utility companies in the New York district. An order for a very large turbo-generator unit is pending and will probably be placed in a few days. Negotiations are also under way for substation equipment. Poles and line hardware particularly have been in considerable demand, although no outstanding orders are reported. Central-station purchases to date are said to be somewhat better than they were last year. Transformers are also moving actively, several substantial inquiries have been received, and one order totaling more than $100,000 was placed by a holding company for its Georgia and Florida properties. In the industrial field sales of small motors and equipment continue steady, and a slightly increased interest is apparent in apparatus of larger size. Inquiries being received each week show no indication of a slackening in demand. Jobbers report spotty conditions, with some activity in fans in expectation of warmer weather.

Sales at a High Level in St. Louis District—Inquiries Interesting

Central-station and industrial equipment sales are holding up to a high level in the St. Louis district, according to the majority of the manufacturers. During the past week an order was placed for large steel-mill electrical equipment, consisting of motors for driving rolls, motor-generator sets, switching equipment, auxiliary motors and all machinery required to make what is said to be the latest-design and most complete rolling-mill electrical outfit. The total amount of the order was nearly $250,000. The demand for pure silica in smelting, soap manufacture and many other industrial purposes has caused unusual activity in the silica mines south and west of St. Louis. Two of these properties, which have been developed in only a small way, are getting estimates on electrically driven drilling, crushing and sizing apparatus, as well as oil-fired sand driers. The volume of business in appliances, particularly ranges, is reported as very encouraging.

Power Apparatus in Demand on the Pacific Coast

Machinery and power apparatus business is exceptionally varied on the Pacific Coast. Orders include 175 small motors for oil-burner service, largely ½-hp., four oil circuit breakers, 70,000-volt, for heavy outdoor service; 3,000 watt-hour meters for San Francisco territory and 40 duplex posts with complete coils and cable for street-lighting service in the main business district of San Jose. Other orders include such varied items as twelve assorted motors, 5-hp. to 40 hp., for general mill purposes; 1,500 assorted renewable fuses of large amperage and a 100-ton oil-electric locomotive for a lumber company. A San Francisco street-railway company purchased a 750-hp., 440-volt, slip-ring, three-phase motor, and an aggregate of ten assorted motors were sold to several companies for oil-well drilling service. Dealers' business is only fair in northern California, though good in the southern end of the state, and orders are only slightly removed from the hand-to-mouth stage.

Contracts for approximately $250,000 worth of waterwheels, generators, switchboards, etc., were awarded by a central-station company for a project on the Elwha River, Clallam County, Wash. Bids will be asked for at an early date to cover the construction of two large substations in connection with the electrification of the Cascade Tunnel. Scattering orders for motors for lumber-mill electrification were also reported, and inquiries have been received from a mill in Tacoma for an aggregate of 1,000 hp. of motors. A small pulp plant has also placed a contract for electrical machinery and equipment with a local jobber.

Aggregate Sales in Southeast in Steady Volume

Generally good business with few outstanding sales characterizes the electrical activities in the Southeast. One of the leading jobbers says that his May business is 25 per cent ahead of the same month last year and that his cumulative business this year to date is 26 per cent over the volume for the same period of 1925. Considerable activity is to be noted in the commercial and industrial lines with the receipt of excellent orders for motors from the New Orleans territory, while purchases of construction materials have been particularly gratifying in the New Orleans, Birmingham, Atlanta and Savannah districts. Florida continues to place orders for central-station materials, and orders are reported this week from Jacksonville for switchboards and substation equipment.

Line-construction materials, of both the high-tension and the distribution type, continue in strong demand as the expansion programs of the larger power companies progress, and municipalities are also buying line materials in quantities above the average. A Georgia power company placed an order last week for $15,000 worth of distribution transformers. Small contracting business is again active, except in the Atlanta territory, where a half-hearted strike is under way among certain of the electrical contractors' employees. Campaigns by various large central-station companies throughout the section are serving to stimulate the appliance market, and excellent results are reported on practically every sales campaign undertaken. Particular emphasis is being placed upon electric ranges, refrigerators, flatirons and display lighting activities. The early hot spell has accelerated the movement of fans, and reports indicate that dealers are having difficulty in keeping sufficient stocks on hand.

Outlook Promising in Middle West—Utilities Active

The outlook for the Middle West assumed a somewhat better aspect this week with industrial plants optimistic. An encouraging report from the Illinois Department of Labor shows that while the industries of Illinois are slowing up a trifle, the actual number of unemployed is negligible. Further reports from mercantile reviews show a decrease over last week in sales volume but an increase compared with the sales of a year ago. The various utility companies are actively engaged in construction work. One company placed a contract for a substation amounting to $100,000. There has been quite a demand for apparatus, some of the items purchased being six air heaters, 48 steel-inclosed isolated-phase truck-type switch units valued at $200,000, 695 direct-current watt-hour meters and a quantity of current transformers. Maintenance purchases have been quite large but are being limited to 30-day requirements. Jobbers' sales remain normal. There is no unusual activity noticed and generally business is continuing on a satisfactory basis.

Activities of the Trade

Pittsburg Transformer Company Purchases Additional Property

The Pittsburgh Transformer Company has recently purchased the holdings of Wilson & Company on the North Side, Pittsburgh. This property extends from Preble Avenue to the Ohio River and parallels the Manchester plant of the company. It has sidings on the Pennsylvania and Baltimore & Ohio Railroad, running the full length of the property, as well as water shipping facilities on the Ohio River. The property contains several brick buildings, one of which is five stories high and of modern construction. The company will not use the property at present, but will keep it available for future expansion.

Westinghouse Sales Executives Make Headquarters in New York

Carrying out the reorganization of the sales department, which involves the reallocation of the managing personnel and the creating of several new activities, as announced recently by E. D. Kilburn, vice-president and general manager of the Westinghouse Electric & Manufacturing Company, several of the sales managers have moved their headquarters to New York City. The managers now making their headquarters at the company's New York office, 150 Broadway, are M. B. Lambert, transportation sales manager; G. H. Froebel, central-station sales manager, and Bernard Lester, assistant to the industrial sales manager.

International Combustion Gets Orders for Steam Generators

Eight large industrial and central-station companies have recently placed orders with the International Combustion Engineering Corporation, 43 Broad Street, New York, for its new combustion steam generators. Orders were received from the following companies: The United States Rubber Company, Morgan & Wright plant at Detroit, two generators; the Bethlehem Steel Company, Sparrows Point (Md.) plant, two generators; the New York Edison Company, Fourteenth Street plant, four generators; the Commonwealth Edison Company, Calumet station; the Chicago National Enameling & Stamping Company, Granite City, Ill.; the New York, New Haven & Hartford Railroad Company, Coscob station, two generators; the Staley Manufacturing Company, Decatur, Ill., and the Solvay Process Company, two generators.

The A. J. Lindemann & Hoverson Company, Milwaukee, manufacturer of electric ranges and appliances, announces the appointment of J. H. McKenna as manager of the New York office at 405 Lexington Avenue.

The Packard Electric Company, Warren, Ohio, manufacturer of transformers and automotive cables, announces that effective May 11 the A. J. Myers Company, 611 Howard Street, San Francisco, has become its exclusive agents for the state of California north of Fresno as well as the entire state of Nevada. The Myers company succeeds the H. B. Squires Company as Packard agents.

The Graybar Electric Company announces the signing of contracts for several important street-lighting installations in Florida and Maryland. The places where installations are now under way include Orin Manor, Orlando, Fla.; Vero Beach, Fla., and Baltimore, Md.

The Baldor Electric Company, 4351 Duncan Avenue, St. Louis, manufacturer of electric motors, announces the opening of an office at 10-216 General Motors Building, Detroit, to take care of eastern Michigan, Ohio and Indiana. G. E. Edscorn, who has been with the St. Louis sales department for about eight months, will be district representative.

The United Gas Improvement Contracting Company, Philadelphia, builder of industrial plants, power plants and other public works, announces the opening of an Atlanta office in the Healey Building, with Rawson Collier in charge as Southern representative.

The Pittsburgh Reflector Company, Bowman Building, Third Avenue and Ross Street, Pittsburgh, announces that it has developed a new industrial reflector for the lighting of high interiors having ceilings of 25 ft. to 50 ft. or more in height. The reflector is known as the No. I-1000 and is designed for use with 300, 500, 750, 1,000 and 1,500-watt incandescent lamps.

The Rutenber Electric Company, Marion, Ind., manufacturer of electrical appliances, has appointed J. S. Colt, formerly secretary and manager of the Potomac Electric Appliance Company of Washington, D. C., as district sales manager at Washington.

The Westinghouse Electric & Manufacturing Company announces that it has recently received orders for control equipment for seven automatic substations to be used for the operation of coal mines. The company has also recently received orders from central-station companies for 28 sets of outdoor automatic reclosing equipment.

The Killark Electric Manufacturing Company, 3940 Easton Avenue, St. Louis, announces that it is now offering a new bell-ringing transformer combined with an outlet box cover so that it can be mounted directly on a 3-in. or 4-in. outlet box.

The Newark Electrical Supply Company, 223 Market Street, Newark, N. J., has purchased the five-story building at 152 Mulberry Street. The company will concentrate operations at this location after the building is remodeled and will discontinue the retail business heretofore conducted.

The Lewis Electrical Supply Company has become distributor for the Boston metropolitan district for the electric refrigeration equipment manufactured by the Copeland Products Company, Detroit. J. W. Clark has been made sales manager of the refrigeration department, with headquarters at 121 Federal Street, Boston.

The Westinghouse Lamp Company announces the removal of its Boston office to the Rice Building, 10 High Street, where space has been allotted by the Westinghouse Electric & Manufacturing Company's New England sales headquarters.

The Lamson Company, Syracuse, N. Y., anonunces that Willard Hall has been appointed New York division manager, with headquarters at 39 West 32nd Street, New York City, in charge of the electrical refrigeration division of the company.

New Equipment Available

Pole-Pruning Saw

A pole-pruning saw for high-voltage tree trimming has been placed on the market by the Bartlett Manufacturing Company, 428 East Lafayette Avenue, Detroit. This saw, known as the No. 4 pole-pruning saw, has a 16-in. blade with seven teeth per inch and is recommended for limbs larger than can be handled by the company's insulated tree trimmer. The head, made from cold-rolled carbon steel, is fastened to the pole by three bolts and is made of two strips of steel riveted together so as to secure a truss-shaped support for the blade, which is fastened between the two sides. A hook on the head serves as a means for hanging the tool on a limb when not in use.

The saw, which is securely held by the head, can be adjusted to three angles to suit the operator's position, and the blade is ground for clearance, which prevents binding. Poles, 1¼ in. by 1¾ in., made of straight-grain spruce or basswood, shellacked to prevent absorption of moisture, are supplied in lengths from 8 ft. to 16 ft. with the 12-ft. length recommended for general use.

De-aërating Water Heater

A de-aërating water heater that stops corrosion in piping, boilers and economizers by removing dissolved air from the water has been placed on the market by the Cochrane Corporation, Seventeenth Street below Allegheny Avenue, Philadelphia. The apparatus is similar in principle to an open feed-water heater but provides for prolonged agitation of the water after it has been heated to the temperature of the steam. It may be operated at any pressure, as above or below atmosphere, and can utilize exhaust steam from auxiliaries, vapor from evaporators or steam led from the intermediate stages of a turbine. It may also be operated with live steam if other supplies are not available.

New Trade Literature

AIR-BREAK SWITCH.—Circular P issued by Schweitzer & Conrad, Inc., 4435 Ravenswood Road, Chicago, describes and illustrates the "Pantograph S & C" air-break switch designed for high-voltage installations. Illustrations showing several typical installations are included.

TREE TRIMMERS.—The Bartlett Manufacturing Company, 428 East Lafayette Avenue, Detroit, is distributing a folder entitled "Safety First for Tree Trimmers" in which it describes the Bartlett insulated tree trimmers.

ASBESTOS PRODUCTS. — The Asbestos Shingle, Slate & Sheathing Company, Ambler, Pa., has issued a booklet describing the Ambler asbestos products for the use of public utilities and electrical manufacturers, including the new ebonized asbestos lumber recently developed for use in control boards and panels. Data on the physical and electrical characteristics of various grades and thicknesses of asbestos lumber are included.

CONTROL EQUIPMENT.—The General Electric Company, Schenectady, N. Y., is distributing bulletin GEA-388 covering its type "MT" control equipment for direct-current series-wound crane bridge and trolley motors. A diagram of connections of CR4426-A5 magnetic panel and curves showing in detail the motor torques and speeds that may be expected with these equipments when operating a 30-minute rated series-wound motor are included.

STARTING SWITCHES.—Bulletin No. 710 issued by the Allen-Bradley Company, 286 Greenfield Avenue, Milwaukee, covers the new line of the Allen-Bradley type "J-1552" form T, across-the-line starting switch equipped with "Inducto-therm" relays. The "Inducto-therm" relay is illustrated and described, and an illustration shows the application of the starter to refrigerating machine service.

PRIMARY RESISTANCE STARTERS.—The Allen-Bradley Company, 286 Greenfield Avenue, Milwaukee, has issued bulletin No. 600, containing a discussion of the merits of the various types of starters for squirrel-cage motors with emphasis on the characteristics of the compression resistor type. A number of illustrations and several oscillograms on the performance of the different types of starters are included.

VENTILATING FANS.—The American Blower Company, Detroit, is distributing leaflets covering the American Blower household ventilating fan with a permanent wall fixture and with an adjustable frame to fit any standard-width window.

ELECTRIC EQUIPMENT FOR TEXTILE MILLS.—"Motor Drive in Textile Mills" is the title of bulletin GEA-374 issued by the General Electric Company, Schenectady, N. Y., which illustrates various motor applications in the textile industry. An illustration shows the first installation of induction motors in a textile mill put in service in 1894 and still in constant use.

ELECTRICAL EQUIPMENT FOR HEATING AND VENTILATING SYSTEMS.—Motor application No. 7,379 issued by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., covers the subject of the application of motors and their control for heating and ventilating modern buildings. It contains a complete discussion of the type of fans and motors available for fan drive, types of control and distinctive characteristics of motors and controls, with illustrations of equipment and engineering data.

ELECTRIC RANGES, WATER HEATERS, ETC.—The Edison Electric Appliance Company, Inc., 5600 West Taylor Street, Chicago, has issued catalog A-560, entitled "Hotpoint Servants," describing its electrical appliances, including electric ranges, water heaters, cookers and bakery, hotel and restaurant equipment. The company is also distributing a leaflet covering the new "Hotpoint Kab-base" range, a new combined kitchen cabinet and electric range.

OIL ENGINE.—Bulletin No. 707 issued by the Foos Gas Engine Company, Springfield, Ohio, covers its type "L" Diesel engine for use on cranes, shovels, Diesel locomotives and other types of mobile and semi-mobile equipment requiring self-contained independent power plants.

ELECTRIC HEATING EQUIPMENT.—Bulletins GEA-408 and GEA-380 issued by the General Electric Company, Schenectady, N. Y., describe and illustrate respectively the "G-E" electric heating equipment for industrial ovens and the "G-E" helicoil sheath wire units.

WELDING RODS.—The Mueller Brass Company, Port Huron, Mich., is distributing a folder covering the Mueller brass and bronze welding rods. Attention is called to its "Blue Tip" Tobin bronze welding rod for general repairing of all kinds of cast iron, malleable iron and steel parts.

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number:

Purchase and agency is desired in Manila, Philippine Islands (No. 20,850), for unit batteries for flashlights.

Purchase is desired in Paris, France (No. 20,845), of electric clothes-washing machines and dish-washing machines. Agency is also desired for wiring devices and electrical appliances (No. 20,849) and for power-mining machinery (No. 20,794.)

Purchase is desired in Oslo, Norway (No. 20,844), of electrical appliances.

An agency is desired in Alexandria, Egypt (No. 20,848), for electrical material, equipment and supplies, radio sets and parts, small and medium horsepower Diesel and semi-Diesel engines.

An agency is desired in Vienna, Austria (No. 20,847), for vulcanized fiber.

Purchase is desired in Madras, India (No. 20,852), of small electric furnaces.

Purchase is desired in Rio de Janeiro, Brazil (No. 20,846), of electric railway material.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

FALL RIVER, MASS.—The City Council is considering replacing the gas street lamps now in use throughout the city with electric lamps, and also to increase the candle power of the "white way" lamps.

SUDBURY, MASS. — The Ford Motor Company, Detroit, plans to build a hydro-electric plant in connection with its proposed local automobile parts manufacturing works.

Middle Atlantic States

DOLGEVILLE, N. Y.—Work has started by the Utica (N. Y.) Gas & Electric Company on the erection of a transmission line between Dolgeville and Inghams Mills to connect with the power station of the Adirondack Power & Light Corporation at Inghams Mills.

GREECE, N. Y.—A proposal to form a new lighting district in the town of Greece calling for the installation of 750 lamps on 36 miles of rural highways, is under consideration by the town officials. Street-lighting service is supplied by the Rochester (N. Y.) Gas & Electric Company.

NEW YORK, N. Y.—Plans have been filed by the United Electric Light & Power Company for a substation, at Locust Avenue and 134th Street, to cost about $100,000. Thomas E. Murray, Inc., 55 Duane Street, is engineer.

NORTH TONAWANDA, N. Y. — Plans for the proposed highway across the town include the installation of street lamps.

ROCHESTER, N. Y.—The installation of additional street lamps in various parts of the city is under consideration by the City Council. The cost is estimated at about $20,000.

UTICA, N. Y.—Plans are being prepared by the Utica Gas & Electric Company for an office and operating building at Genesee and Court Streets, to cost $450,000. Schenck & Williams, Third National Bank Building, Dayton, Ohio, are consulting engineers.

WELLSVILLE, N. Y.—The Public Service Commission has approved the exercise by the Niagara, Lockport & Ontario Power Company, Buffalo, of electric franchises in the towns of Independence, Alma, Friendship, Scio, Willing, Wirt and Clarksville, and the town and village of Wellsville. The company proposes to erect a transmission line to supply energy to the local municipal electric plant. In towns of Clarksville, Friendship and Wellsville transmission rights only will be exercised. In other towns distribution service will also be given.

GLOUCESTER, N. J. — The Gloucester Township Committee has authorized the installation of additional street lamps on Woodland Avenue, in Chews Landing, and on the Little Gloucester Road from Grenlock to Little Gloucester.

PERTH AMBOY, N. J.—The Board of Public Works has authorized bids called for equipment for the electrification of the municipal waterworks.

BOYERTOWN, PA. — The Boyertown Burial Casket Company plans to install electric power equipment in connection with the rebuilding of its plant, recently damaged by fire, with a loss of about $500,000.

BRADFORD, PA.—Further extensions to the ornamental lighting system in the business district is under consideration by the City Council. Improvements to the street-lighting system in the outlying districts late in the fall is also contemplated.

CHEAT HAVEN, PA.—The West Penn Power Company, Pittsburgh, plans to install three 1,600-kw. generators and auxiliary equipment at its local hydro-electric power plant here, now under construction.

KUTZTOWN, PA. — Steps have been taken by the Chamber of Commerce to secure the installation of an ornamental lighting system in Kutztown.

MEADVILLE, PA.—Plans for the proposed factory building to be erected by the Hookless Fastener Company, to cost about $100,000, include a power plant.

MIDDLEPORT, PA.—The Hudson Coal Company plans to install electric power equipment in its proposed local colliery, to cost about $350,000.

PHILADELPHIA, PA. — A permit has been granted the Philadelphia Electric Company for a substation at 52-54 North Ninth Street, to cost about $90,000.

STOVERSTOWN, PA.—The Edison Light & Power Company, York, contemplates the erection of a transmission line from Bair to Stoverstown for local service.

BALTIMORE, MD.—Bids will be received by the Board of Awards, office of the City Register, City Hall, until June 23, for furnishing cast iron lamp posts for the Division of Lighting.

SPENCER, W. VA. — The Council has awarded a contract to the Spencer Water & Ice Company to install an ornamental lighting system.

DANVILLE, VA. — The Appalachian Power Company, Bluefield, W. Va., is negotiating for the purchase of the municipal light and power plant, and plans extensions in transmission lines in this section.

PULASKI, VA.—Plans for the proposed local steel and iron works to be erected by Robert E. Baker, 2558 Derbyshire Road, Cleveland, Ohio, and associates, at a cost of about $150,000, include a power house.

RICHMOND, VA.—Extensions and improvements to the municipal electric plant is under consideration for which bonds have been issued.

WEYER'S CAVE, VA.—The Shenandoah River Power Company has applied to the Federal Power Commission for a license to cover a transmission line to traverse the Shenandoah National Park.

WASHINGTON, D. C.—Bids will be received by the Bureau of Yards and Docks, Navy Department, (closing date not decided), for a refrigerating and ice-making plant at Coco Solo, Canal Zone, including 15 kva. transformers; light and power system, motors, etc.

North Central States

BALDWIN, MICH. — The Michigan United Light & Power Company, Ludington, plans to erect a transmission line here for local service. A franchise has been granted.

EASTLAKE, MICH.—At an election to be held June 28 the proposal to grant the Consumers Power Company, Jackson, a thirty-year franchise to furnish electrical service here will be submitted to the voters. If granted a franchise the company will extend its transmission line to Eastlake.

RAVENNA, MICH.—The Ravenna Power Company, recently organized, plans to erect a transmission line.

CLEVELAND, OHIO.—Plans have been prepared by the Cleveland Electric Illuminating Company for a substation to be erected at Canal and Granger Roads, at a cost of $50,000. E. J. Cook, Illuminating Building, is engineer.

CLEVELAND, OHIO.—Bids will be received at the office of the Commissioner of Purchases and Supplies, Room 226, City Hall, until June 25 for suspension type street lighting fixtures; series multiple transformers; and repairs to coal bunker steel work, for Division of Light and Power. Separate bids to be submitted on each item.

TOLEDO, OHIO.—The City Council is considering the installation of 128 ornamental lamps in Beverly Place.

YOUNGSTOWN, OHIO.—Bonds to the amount of $4,000,000 have been issued by the Ohio River Edison Company, Youngstown, part of the proceeds to be used for extensions to its plant at Toronto, including the installation of new equipment to increase the output by 44,000 hp.

NORTONVILLE, KY. — The Kentucky Electric Power Company contemplates extensions in its transmission lines, for power service, in the coal mining district in the western part of the state.

MISHAWAKA, IND.—The Rural Electric Company, recently organized by Victor H. Schallicol, Edward F. Hahn and L. M. Hammerschmidt, plans to supply electric service to farmers in the vicinity of Mishawaka.

BYRON, ILL. — The Illinois Northern Utilities Company, Dixon, is planning a hydro-electric development on the Rock River at Byron. The proposed plant will have a generating capacity of 4,500 hp.

SPRINGFIELD, ILL. — Work is now under way on the erection of a 66,000-volt transmission line from Muddy River power station, near Harrisburg, to Olney, a distance of about 85 miles, where it will connect with the 66,000-volt line (40 miles long) extending from Olney to Effingham.

FOND DU LAC, WIS.—Plans are being considered by the Wisconsin Power & Light Company, Madison, for the construction of a local coke screening and storage plant, to cost about $40,000.

MADISON, WIS.—Bids are being taken by the Wisconsin Power & Light Company for the erection of a transmission line from Verona to Belleville, a distance of 8 miles.

NEENAH, WIS.—A movement has been started by the City Council and local business men for the installation of ornamental lamps in the downtown district to replace the arc lamps now in use.

JEFFERSON, IOWA.—At an election to be held July 1 the proposal to issue $112,000 in bonds for the construction of a municipal electric light plant will be submitted to the voters.

JOPLIN, MO. — The Empire District Electric Company is considering extending its transmission line into Stella, Wheaton, Fairview and other surrounding towns.

KIRKWOOD, MO.—At an election to be held July 11 the proposal to issue $50,000 in bonds for improvements to the municipal electric light plant and distribution system will be submitted to the voters, and also $150,000 in bonds for reconstruction and extensions of the municipal waterworks.

ST. LOUIS, MO.—Bids will be received by the United States Engineer, St. Louis, until June 22, for one electric generating set for the steamer "Mississippi."

ST. LOUIS, MO.—Plans are under way for the installation of an ornamental lighting system on Grand Boulevard, north and south of Olive Street, by the business men of the district, consisting of 112 lamp standards, mounted with two lamps of 1,500-watt each. S. B. Lovejoy, 1086 Arcade Building, is executive secretary.

HANNAFORD, N. D.—The town officials are considering closing down the municipal electric light plant and obtaining electrical service from the proposed high-tension transmission line to be erected by the Otter Tail Power Company, Fergus Falls, Minn.

OAKES, N. D.—The installation of an ornamental lighting system is under consideration by the City Council.

COLUMBUS, NEB.—The Northwestern Public Service Company, Huron, is making extensions and improvements in its electric plant and transmission and distributing lines, to cost about $120,000.

BAZINE, KAN. — The City Council is considering a bond issue of $15,000 for the construction of a transmission line for local light and power service.

Southern States

ASHEVILLE, N. C. — Steps have been taken by the West Asheville for the installation of an ornamental lighting system on the Haywood Road.

CHARLOTTE, N. C.—Plans are being considered by the Southern Power Company for the erection of a transmission line from Winston-Salem to Elkin, a distance of 40 miles. W. S. Lee is chief engineer.

GREENSBORO, N. C. — Work has started by the North Carolina Public Service Company on the erection of a transmission line between Randleman and High Point, 16 miles long, to cost about $40,000. Electricity will be supplied to towns and villages along the line.

HIGHLANDS, N. C.—The City Council has disposed of a bond issue of $75,000, part of the fund to be used for the installation of an improved lighting system.

SHELBY, N. C.—The Sharon Light & Power Company, recently organized, plans to erect transmission lines in various parts of Cleveland County. B. C. Putnam is interested in the company.

WALNUT COVE, N. C. — Plans are being prepared for the installation of electric light and power plant and water and sewer systems.

WILMINGTON, N. C.—The City Council has contracted with the Tidewater Power Company, Wilmington, for the installation of an ornamental lighting system in the business district.

LUDOWICI, GA.—Plans are under way by the City Council for the installation of an improved lighting system, for which bonds have been issued.

THOMASTON, GA.—The Thomaston Cotton Mills, Inc., plans to install electric power equipment in its proposed mill, for the production of tire fabrics, to cost about $500,000. Robert & Company, Atlanta, are engineers.

GULFPORT, FLA.—Bids will be received by the Town Council until July 6, for a 200-hp. vertical squirrel cage motor, automatic electric control panel, auxiliary 60-hp. gasoline engine, etc., in connection with the proposed municipal waterworks. W. W. Swift is clerk.

LAKELAND, FLA.—Resolutions providing for the installation of ornamental lamps on a number of thoroughfares have been passed by the City Commission.

RIVERIA, FLA.—The Florida Light & Power Company, Miami, has contracted with the city council for the installation of an improved lighting system, using 100-cp. units.

ST. PETERSBURG, FLA.—Bids will be received by R. E. Ludwig, Director of Public Utilities, until June 28 for installing ornamental-lighting systems on Second Street and Fourth Avenue North.

VERO BEACH, FLA.—The City Council is considering calling an election to vote on the proposal to issue $150,000 for extensions to the municipal electric-light and water plant.

WEST PALM BEACH, FLA. — Extensions and improvements to the street-lighting system, to cost about $305,900 this year is under consideration.

JACKSON, TENN.—The Beare Ice & Coal Company plans to install electric power equipment in its proposed local ice-manufacturing plant and cold storage warehouse, to cost about $100,000.

MEMPHIS, TENN.—The Anderson-Tully Company plans to install electric power equipment at its proposed new veneer mill, to cost about $250,000.

NASHVILLE, TENN.—Steps have been taken by the Real Estate Brokers' Association of Tennessee, Inc., for the installation of an ornamental lighting system on Twenty-first Avenue, from West End Avenue to Pierce Avenue, or farther.

SELMER, TENN.—The Southern Cities Power Company, Chattanooga, is negotiating for the purchase of the local power plant, operated by W. C. Moore. If acquired the company plans to extend its transmission line here.

ALEXANDER CITY, ALA.—Extensions to the municipal electric light plant and water works are under consideration.

FALKVILLE, ALA. — The Alabama Power & Light Company, Birmingham, plans to build a local substation to cost about $30,000.

BLYTHEVILLE, ARK.—Arrangements are being made by the Arkansas-Missouri Power Company to take over the electric plants at Piedmont, Arcadia, Ironton, Bismarck and Potosi, Missouri, and to connect these towns by high-tension lines with its plant at Corning, Ark. To make these connections it will require 150 miles of new line. The cost is estimated at $750,000. Ice service will also be supplied in the above towns.

SMACKOVER, ARK.—Plans for rebuilding the local oil refinery of the Henry W. Cross Company, 122 South Michigan Avenue, Chicago, recently destroyed by fire with a loss of about $100,000, include a power plant.

LAKE CHARLES, LA.—The Massasoit Manufacturing Company, Fall River, Mass., will install electric power equiment at its proposed local plant for the production of cellulose, to cost about $200,000.

SHREVEPORT, LA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until July 7 for remodeling the electric passenger elevator in the United States post office and custom house, Shreveport. For details see Searchlight Section.

HOBART, OKLA. — The Southwestern Light & Power Company, Lawton, contemplates improvements to its local system, including extensions to the ornamental lighting system and the erection of a transmission line to the Hobart Country Club, 2 miles south of the city.

TULSA, OKLA.—The Public Service Company of Oklahoma has applied for electric franchises in Ollogah, Talola and Perkins.

WOLF, OKLA.—The Southwestern Light & Power Company, Lawton, which has been granted a franchise to supply electricity in Wolf, plans to extend its transmission line here, a distance of 41 miles. Post office address Maud.

ABILENE, TEX.—Electric power equipment will be installed in the proposed local cotton seed oil mill, to be erected by Anderson, Clayton & Company, Dallas, at a cost of about $400,000.

DALLAS, TEX.—Bids are being received by J. E. Overbrook, architect, Wilson Building, for construction of administration building, girls building, laundry, chapel and power plant, on Fort Worth Pike, west of Wheatland Road, for Home of Our Lady of Charity..

EDINBURG, TEX. — Plans are being prepared by the Valley Electric & Ice Company for extensions to its local electric light plant, improvements to water system and an addition to ice plant. The cost is estimated at $250,000.

WICHITA FALLS, TEX. — Plans are being prepared by the Peoples Ice Company for the construction of a cold storage plant, to cost about $100,000.

Pacific and Mountain States

ABERDEEN, WASH.—The Gray's Harbor Railway & Light Company has announced plans for a proposed hydro-electric development on the Cowlitz River. The installation would comprise three units, rated respectively at 48,000-kw., 88,000-kw. and 30,000-kw. The first plant is to be installed at Mayfield. The ultimate cost of the development is estimated at $20,000,000.

PORT ANGELES, WASH.—The Northwestern Power & Light Company has been granted a license by the Federal Power Commission to build a hydro-electric project in Glines Canyon.

TACOMA, WASH.—The City Council has applied for permission to use water from the North Fork of the Skokomish River, for the second unit of its municipal hydro-electric plant, to develop about 35,000 hp. The cost is estimated at $6,000,000.

BEAVERTON, ORE.—The Puget Sound Light & Power Company, Seattle, plans to rebuild its local substation recently damaged by fire with a loss of about $30,000.

PORTLAND, ORE. — The Northwestern Electric Company contemplates the construction of a substation, indoor type, in the Alberta district to cost about $50,000.

BERKELEY, CAL. — The H. J. Heinz Company, Pittsburgh, Pa., it is reported, plans to build a local canning plant including power house. The cost of the entire project is estimated at $750,000.

BEVERLY HILLS, CAL. — The City Council has authorized the installation of ornamental lamps on Angelo Drive, between Benedict Canyon Drive and the west city limits.

GLENDALE, CAL.—The City Council has authorized the installation of ornamen-

tal lamps on Glenoaks Boulevard from Grandview Avenue to the city limits, and on San Fernando Road from Los Feliz Road to Tyburn Street, concrete standards to be used on the latter.

HAT CREEK, CAL.—A license has been issued by the Federal Power Commission to the Red River Lumber Company, 807 Hennepin Avenue, Minneapolis, Minn., to build a 6,500-hp. plant on Hat Creek.

LOS ANGELES, CAL.—The Los Angeles Gas & Electric Corporation plans to build a substation, at 1355 Lawrence Street, to cost about $25,000.

LOS ANGELES, CAL. — The Federated Venice Associations have petitioned the City Council to install ornamental lamps on the Ocean Front Walk between Avenue 51 and 56, and also for electric lamps on Leona Boulevard, between Washington Boulevard and Trolleyway.

LOS ANGELES, CAL. — The Board of County Supervisors has authorized the installation of ornamental lamps on portions of Alfred, Noble and Orlando Streets; Kings Road; Sweetzer, Clinton and Rosewood Avenues, requiring 75 concrete standards, and on portions of Mount Curve Avenue; Parkman, Athens, Attica and Concha Streets, requiring 120 concrete standards.

MARYSVILLE, CAL.—The Pacific Gas & Electric Company, San Francisco, has filed plans for an addition to its local power plant.

PASADENA, CAL.—The Board of City Directors has granted a petition authorizing the installation of ornamental lamps in a large section of territory on the west side of the Arroya Seco.

PASADENA, CAL. — The City Council has adopted a resolution providing for the installation of ornamental lamps on Washington Street, from Hill Avenue to the east boundry line of the city.

PASADENA, CAL.—The installation of an additional 15,000-kw. steam generating unit at the municipal electric plant, has been recommended in the budget for 1927 filed by Benjamin F. Delanty, general manager. The cost is estimated at $750,000 and will include a turbine, a 1,000-hp. boiler, condenser, etc. The rebuilding of the Lamanda Park substation is included in the report.

SACRAMENTO, CAL.—The City Council is considering calling a special election to vote on a proposal to issue $257,000 in bonds, for the installation of an improved fire-alarm system.

SAN DIEGO, CAL.—The City Council is considering a petition for the installation of ornamental lamps on First Street, between B and Beach Streets.

SAN PABLO, CAL.—The Standard Sanitary Manufacturing Company, Bessemer Building, Pittsburgh, Pa., will install electric power equipment in its proposed local plant, to cost about $500,000.

BUTTE, MONT.—The City Council has authorized the installation of an ornamental lighting system in the district known as the "Inside Zone," to cost about $18,000.

GREAT FALLS, MONT. — The City Council has passed an ordinance providing for the establishment of a street-lighting district, including Third Avenue, South and Thirteenth Streets. M. L. Morris is engineer.

MANITOU, COLO.—Plans are under way for the installation of an ornamental lighting system along the Ute Pass leading out of Manitou to Cascade and the Green Mountain Falls, electricity to be supplied by the municipal plant at Colorado Springs. The right-of-way will be furnished by Thomas Cusack of Cascade, who will also advance the cost of the line. This line will eventually become the property of the City of Colorado Springs.

Canada

ST. JOHN, N. B.—Extension of the transmission line of the New Brunswick Electric Power Commission to Havelock (10 miles) has been approved by the provincial government. Authority was also given the commission to extend its service from Moncton to Shediac.

MANIWAKI, QUE.—Surveys are being made by the International Paper Company, 100 East Forty-second Street, in the vicinity of Maniwaki, in connection with its power project on the Gatineau River. Further development at this point is under consideration.

ST. HELENE DE BAGOT, QUE.—Authority has been given the Southern Canada Power Company, Montreal, to erect a transmission line in the vicinity of St. Helene de Bagot.

Electrical Patents

Announced by U. S. Patent Office

(Issued May 18, 1926)

1,585,326. MEASURING DEVICE IN THE CONNECTING LINE BETWEEN TWO ELECTRIC POWER STATIONS WORKING IN PARALLEL; W. Beusch, Zug, Switzerland. App. filed Aug. 20, 1924.

1,585,350. DETACHABLE PLUG; W. Ile, Jackson, Mich. App. filed May 19, 1925.

1,585,351. ELECTRIC CRANE; P. D. Ionides, London, England. App. filed July 2, 1924. In a motor-control system the combination of an internal-combustion engine, a dynamo-electric generator adapted to be driven thereby, a plurality of electric motors deriving their current from the generator, a reversing switch in each motor circuit, a throttle valve controlling the speed of the internal-combustion engine, an accelerator operating the throttle valve and an interlock between the accelerator and the switches such that no circuit can be closed when the accelerator is in operation.

1,585,359. INSULATOR; A. O, Austin, Barberton, Ohio. App. filed Dec. 6, 1920. For high voltages.

1,585,437. ROASTER; R. H. Talbutt, Baltimore, Md. App. filed Feb. 20, 1926. Wherein a rotary container or roasting cylinder is located within an outer insulating shell or frame.

1,585,439. ELECTRIC BRAKING SYSTEM; R. N. Thomas, East Orange, N. J. App. filed May 31, 1924. For electric motor-driven machines such as printing presses and the like, wherein electrically operated friction brakes are applied upon the opening of the driving motor circuit.

1,585,448. ELECTRICAL APPARATUS; J. M. Weed, Schenectady, N. Y. App. filed Jan. 29, 1920. Windings for electrical apparatus, such as transformers, reactors and the like, which primarily possess high inductance, but which also unavoidably possess an appreciable amount of capacitance or electrostatic capacity. To associate capacitance with the inductance so as to eliminate the possibility of producing transient potential gradients within the windings, which are far from uniform.

1,585,497. PROCESS OF MANUFACTURING DUCTILE TUNGSTEN; A. Just, Budapest, Hungary. App. filed Feb. 23, 1924. Suitable for filaments for incandescent lamp or other purposes.

1,585,508. RESONANCE ARRANGEMENT PARTICULARLY APPLICABLE TO ELECTRIC RELAYS; C. Oliver, Chislehurst, England. App. filed April 18, 1924. Mechanisms having tuned oscillating members capable of attaining an amplitude of vibration when set in motion by external means which may be operated from a distance or otherwise.

1,585,517. SWITCH MECHANISM; E. B. Thurston, Toledo, Ohio. App. filed July 13, 1921. Electromagnetic motor-operated switch which has especial utility when incorporated in connection with polyphase electric current torque or high-internal-resistance switch-operating motors for elevator service.

1,585,518. CONTROL MECHANISM; E. B. Thurston, Toledo, Ohio. App. filed Nov. 12, 1921. Elevator controller equipped with an alternating electric current drive, having advantages for smoothness of operation at high speeds, especially in ranges above 250 ft. per minute and even up to elevator speed maxima, the connections operable to effect gradual and quick pick-up on high speed with quick but gradual stopping obtained by having the control connections through the low speed.

1,585,519. MULTISPEED-MOTOR PROTECTION; E. B. Thurston, Toledo, Ohio. App. filed Dec. 14, 1925. As used on elevators.

1,585,521. MANUFACTURE OF ALKALINE SECONDARY OR STORAGE BATTERIES; W. H. Bancroft, Bryn Athyn, Pa. App. filed June 18, 1925.

1,585,580. FLASH SOCKET FOR INCANDESCENT ELECTRIC LAMPS; A. K. Wihanto, Jamaica Plain, Mass. App. filed May 10, 1924. Alternately lighted and extinguished so as to afford flashes of light.

(Issued May 25, 1926)

1,585,646. ELECTRIC FUSE; H. T. Bussmann, St. Louis, Mo. App. filed May 7, 1919. Renewable.

1,585,647. ELECTRIC FUSE; H. T. Bussmann, St. Louis, Mo. App. filed May 7, 1919. Fuse link having an area of reduced cross-section and an area of enlarged cross-section and an arc shield protecting that surface of the enlarged cross-section facing the area of reduced cross-section.

1,585,688. END FITTING; C. V. Perry, West Haven, Conn. App. filed June 4, 1924. For flexible cable or the like without requiring the usual threaded connector.

1,585,718. MOUNTING; E. H. Jacobs, Chicago, Ill. App. filed April 22, 1921. Insulator mounting.

1,585,760. ACCUMULATOR PLATE; J. McD. Burnett, Weston-by-Welland, England, and J. A. Fullilove, Market Harborough, England. App. filed May 6, 1924. Having an insulating frame secured around the edge to prevent contact with an adjacent plate.

1,585,773. LIGHTING FIXTURE; F. S. Crowell, Toledo, Ohio. App. filed Jan. 8, 1925. For use on porches or exteriors of buildings.

1,585,787. LIGHTING FIXTURE; J. K. Riddle, Toledo, Ohio. App. filed Oct. 23, 1924. Provided with an arm and arranged to permit the use of shades if desired.

1,585,800. ELECTRIC JOINT; E. Thedinga, Berlin, Germany. App. filed March 24, 1924. Of the type in which an insulating body provided with a screwing clamping member is formed with a hole for the passage of a flexible conductor therethrough, which conductor is adapted to be passed through an eccentric bore of the clamping member for being turned around when screwing down the clamping member.

1,585,803. MANUFACTURE OF ELECTRIC LAMPS AND THE LIKE; C. C. Van Voorhis, East Orange, N. J. App. filed June 1, 1922. Method of handling unstable substances whereby they may be used in a substantially pure condition, uncombined with oxygen, water vapor and the like.

1,585,840. SPRING-BINDING POST; A. P. Fahnestock, Long Island City, N. Y. App. filed June 6, 1923. Wherein the conductor terminal may be readily applied to or removed from the clip through the instrument of the terminal piece alone.

1,585,848. ELECTRIC METER ADAPTER; B. E. Getchell, Plainville, Conn. App. filed March 14, 1925. Which serves interchangeably as an adapter for various types of meters.

1,585,849. MEANS FOR CONNECTING ELECTRIC CABLES TO CARBON BRUSHES OR THE LIKE; E. Gundre, Levallois-Perret, France. App. filed Nov. 17, 1924.

1,585,859. FUSE; J. W. Hooley, Larchmont, N. Y. App. filed Oct. 30, 1925. A sheet of fusible and conducting material having characters cut out of the same whereby the capacity of the fuse is reduced to what is indicated by the characters.

1,585,874. STORAGE-BATTERY TERMINAL; E. M. Powell, Clermont, Ind. App. filed Aug. 22, 1922.

1,585,888. ARMORED CABLE; G. V. Budlong and A. O. Hoeftmann, Worcester, Mass. App. filed Sept. 2, 1920. Having a metallic non-magnetic armor and constructed and arranged to permit the use of an exploring coil in localizing breaks or faults.

1,585,988. ELECTRIC CURRENT CONTROLLER; G. Hesse, Los Angeles, Cal. App. filed May 9, 1924. For automatic control of electric flash signs.

1,585,991. KEYLESS LAMP SOCKET; W. Ile, Jackson, Mich. App. filed May 9, 1925.

1,585,992. CAP AND SHELL FASTENING FOR LAMP-SOCKET CASINGS; W. Ile, Jackson, Mich. App. filed July 2, 1925.

1,586,011. EXPLOSION-PROOF FUSE; W. W. Sloane, Chicago, Ill. App. filed July 10, 1920. A safety fuse for use in gaseous mines. In which the fuse is inclosed in the casing and cannot be removed therefrom without first breaking the electric circuit.

1,586,034. ELECTRICAL APPARATUS; J. C. Federle, Dayton, Ohio. App. filed Sept. 25, 1922. Power-plant and battery-charging system wherein the battery-charging operation will be discontinued after the battery has reached a certain charge, but, if desired, the system may be so controlled that the engine will keep on running after the battery has been disconnected from the generator.

1,586,078. MEANS FOR CONVERTING ELECTRIC CURRENTS; F. J. Fischer, Dresden, Germany. App. filed March 13, 1924. A device operating in a manner similar to a transformer and designed mainly for very high voltages. For measuring and testing high-current plants.

1,586,124. ELECTRICAL CONNECTOR FOR TRANSMISSION LINES; C. Smith, Pittsburgh, Pa. App. filed June 21, 1924. Whereby a broken transmission line, particularly one carrying high voltage, may be repaired with safety and without substantial interruption to the service.

Business Facts for Electrical Men

Selected Statistics Presented Graphically for the Use of All Interested in Analyzing the Trend of the Electrical Business

Trend Toward Centralized Power Production

WITHIN the intricate fabric of the electric light and power industry are to be found many trends of varying importance. The industry is continually changing its basic operations—developing each fiber of its structure and thereby strengthening the economic whole. New trends are apparent each year in engineering, administration, finances, merchandising, public relations, etc. This ability of the industry to tread new paths of progress, to meet new conditions, is in itself an indication of its flexibility and of the progress to come.

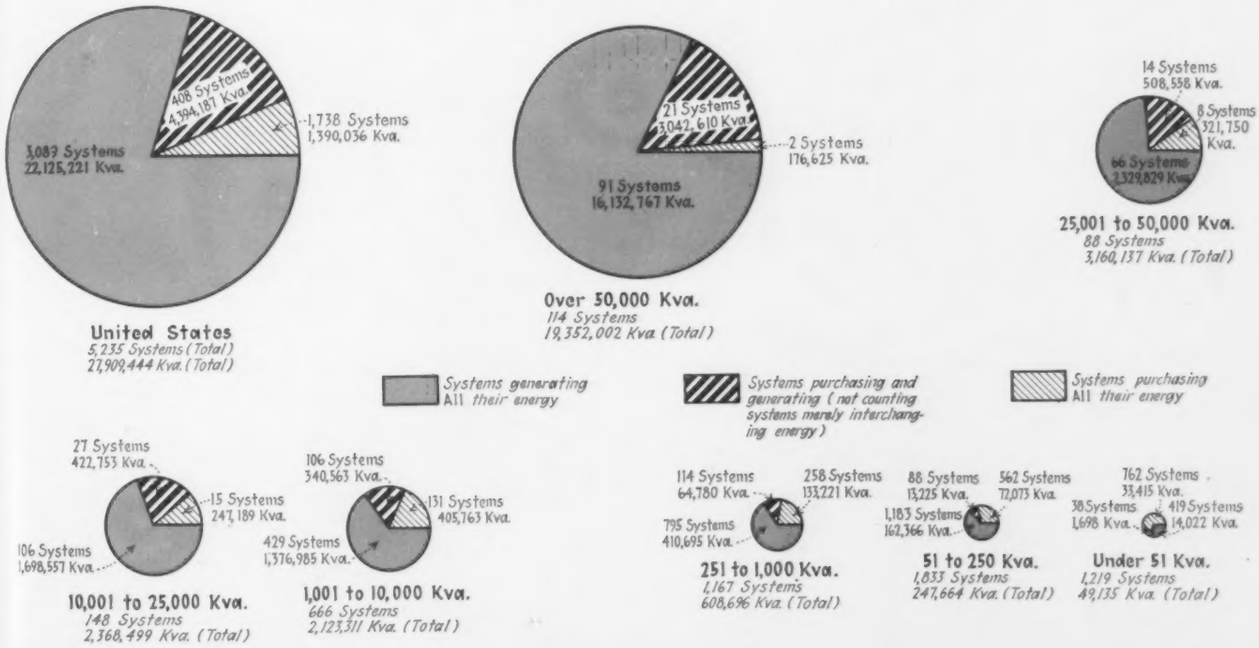
Among these basic trends is one which reflects the tendency toward centralization of power production and the gradual elimination of the small isolated generating plant. Back in 1907 approximately 95.2 per cent of the electric light and power companies of the country generated all or a part of their own energy, only 4.8 per cent purchasing all their energy from the lines of generating companies. In 1912 the proportion of companies generating all or a part of their energy had decreased to 90.7 per cent and those purchasing all their energy had increased to 9.3 per cent. This trend toward large centralized power plants continued until by the middle of the year 1925 only approximately 67 per cent of the companies generating all or a part of their own energy and 33 per cent purchasing all their energy. The tendency of electric light and power companies to purchase all their energy from the larger generating and transmission systems has been, of course, more pronounced in the smaller groups of systems. Today more than 62 per cent of the systems with a generator or transformer rating under 51 kva. purchase all their energy and 38 per cent of the systems under 251 kva. purchase all their energy. Only two systems with a transformer rating of over 50,000 kva. purchase all their energy.

This growth in the number of companies functioning solely as distributors of energy has materially altered the buying structure of the industry. Twenty years ago more than 95 per cent of the industry represented a potential market for electrical and power equipment, from the generator and boiler to the house meter. Today 1,738 companies have no generating or power-house equipment, have no high-tension transmission lines and are potential markets solely for distribution equipment. It is estimated that during 1926 approximately 95 per cent of the total expenditures for additions and extensions will be spent by 832 companies, or less than 16 per cent of the operating companies of the country. There are 4,219 companies in the country with a system rating under 1,000 kva., but this large group of companies —over 80 per cent of the total—will spend less than 2 per cent of the total industry's outlay for new equipment.

Most of the data for statistics in the ELECTRICAL WORLD are gathered by it from original sources. Privilege is freely given to readers of the ELECTRICAL WORLD to quote for use these statistics for any legitimate purpose. While there is no requirement that the source of data be given, yet it would help the ELECTRICAL WORLD in obtaining and compiling further basic information if those who make use of these statistics would give credit to the ELECTRICAL WORLD.

Electric Light and Power Companies Grouped in Accordance with Size of Systems

(Transformer rating used for companies purchasing all or a portion of their energy)



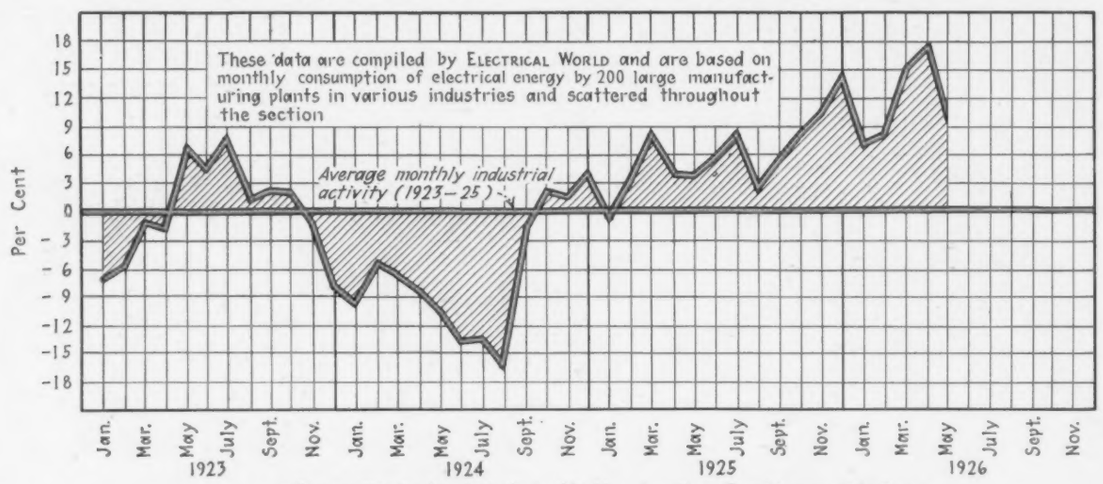
High Industrial Activity in the Southern States

THE ELECTRICAL WORLD presents herewith a new service for its readers in the Southern States in the form of a barometer of industrial activity in various industries of that section. This barometer is based upon the energy consumption of about 200 large central-station power customers distributed throughout the section and in various industries. These monthly consumption data for each industry have been adjusted for seasonal variation and compared with the average monthly consumption during the 36-month period 1923-1925. The monthly activity in each industry has been weighted in accordance with the importance of that industry to obtain the general industrial activity of the section. A barometer for the country as a whole for the month of May will be found on page 1324 of the June 12 issue of the ELECTRICAL WORLD, and similar barometers have been issued for each section of the nation. These barometers may be obtained upon application to the ELECTRICAL WORLD.

The industries of the Southern States have been operating at a high rate of activity since the opening of the year, reaching the peak in April, when an activity of 17.5 per cent above the monthly average for the past three years was recorded. These operations were materially above the activity reported by general industry in the country as a whole during these months. In May a distinct downward trend was recorded by the industries of the Southern States, all of the primary manufacturing industries except the metal industries reporting materially decreased operations. Activity in Southern industries in May, however, was still 10 per cent above the average monthly for the past three years, and this activity compared very favorably with an activity of only 3.6 per cent above the average monthly in May of last year. Such is the picture of industrial operations outlined by the ELECTRICAL WORLD and based upon the monthly consumption of about 200 manufacturing plants scattered throughout the section.

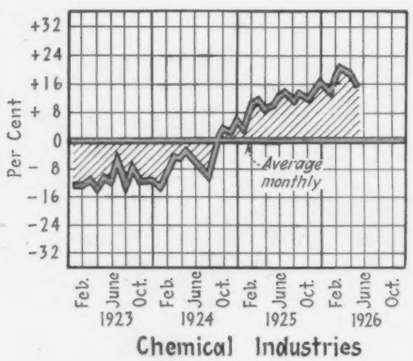
The returns received by the ELECTRICAL WORLD indicate that during May the textile industry of the South was operating at 9.5 per cent above the average monthly. This is materially below the activity reported during March and April, when the textile mills were operating at 18.2 per cent and 13.4 per cent respectively above the monthly average. Decreased activity during May was also reported by the chemical, lumber, paper, and stone, clay and glass industries. The metal industries of the section, however, appear to have increased their relative operations slightly. While the rate of activity in the metal industries due to seasonal reactions was under that of April, yet this decrease under April was not to the extent which would normally be expected.

"Electrical World" Barometer of Industrial Activity in the Southern States

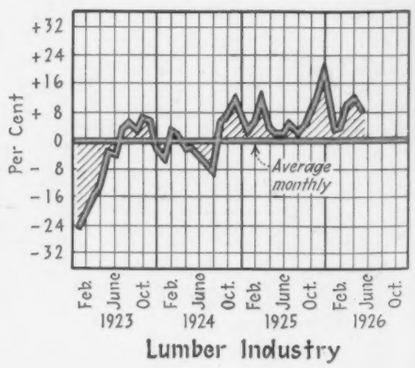


General Industrial Activity in the Southern States

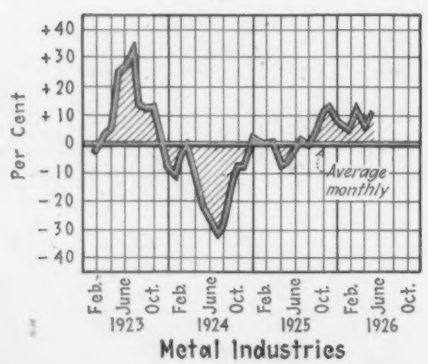
Textiles Industry



Chemical Industries

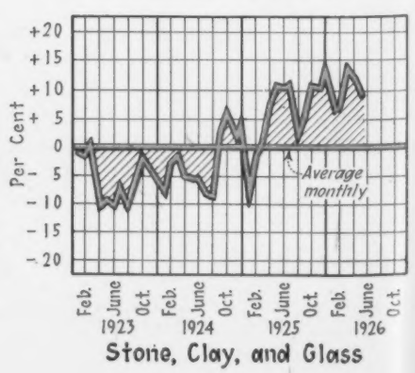


Lumber Industry



Metal Industries

Paper Industry



Stone, Clay, and Glass